



**NETWORK OF EDUCATIONAL INNOVATION  
FOR DEVELOPMENT IN AFRICA**

***THE SITUATION  
OF EDUCATIONAL  
MATERIALS  
IN AFRICA***



**REGIONAL OFFICE FOR EDUCATION IN AFRICA**

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## Introduction

This publication is an attempt to present a general overview of educational materials development, production and dissemination in Africa. Its content is made up of selections from the papers presented at a Seminar-workshop on the topic, organized by the Network of Educational Innovations for Development in Africa (NEIDA) at the UNESCO Regional Office for Education in Africa (BREDA), in Dakar, Senegal, from 3 to 7 October, 1988, as part of the preparatory assistance for a major UNDP/UNESCO education project (RAF/87/169) on Technical Cooperation for Human Resources Development in Africa.<sup>1</sup>

The papers have been grouped under four themes depicting various concerns about educational materials in Africa. In the first section there is a description of the state-of-the-art of educational materials development, production and dissemination in the region. A broad definition of educational materials is provided, and the section goes on to summarize existing educational materials development initiatives in Africa and the problems arising therefrom.

The second section is an overview of educational materials production in nine African countries. These are presented as cases, each including the institutional framework within which the development activities are conducted, the types of materials produced and the strategies and procedures used.

Section three is on private sector initiatives, as observed in two African countries, at the extremes of a progress continuum of educational materials development. The first is of a situation where very little progress has been made in the area of educational materials development, to the extent that concerned individuals are undertaking material production to serve a felt need without any definite profit motive. The second case is of a publishing house, as a private commercial enterprise, helping to alleviate the dearth of educational materials, and also to support government efforts.

Certain materials are often neglected in the education enterprise and so a few of the papers presented at the seminar/workshop focussed on the theme of "Neglected Areas of Educational Materials Development and Production". These

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<sup>1</sup>The activity also has extra financial support from the regular programme budget of the EIF (Educational Infrastructures and Facilities) Unit of BREDA.

papers, five in number, are combined in the fourth section to present the nature of these neglected areas. In some cases, categories of professional educators who are often engaged in material production are neglected while in others the issues and objects required by the education process are neglected.

Finally, the reader is given a summary of the proceedings of the workshop and the reflections of the several contributors to this document in the form of suggestions and recommendations for future action. It is the hope of all the contributors to this volume that action will be taken on the matter of educational materials in various countries in Africa for improved educational practice in the region.

Sandy Bockarie, Ph.D.  
Editor and Workshop  
Consultant

## **Section I**

### **OVERVIEW**

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## Chapter One

# The Educational Materials Situation in Africa

*Sandy BOCKARIE* \*

At the national level, a lot of effort is being made in African countries in the production of educational materials but the absence of a conscious and deliberate effort in this venture at regional or sub-regional levels is easily noticeable. On the whole, there is a recognizable dearth of educational materials in the region.

This paper is on the state-of-the-art of educational materials in the region. It is a synthesis of the attempts, in various African countries as presented in the papers that follow, at developing, producing and disseminating educational materials and equipment.

The context in which educational materials are being developed, produced and distributed, the categories of materials produced, the existing educational materials development initiatives and the problems arising therefrom in the region are briefly dealt with. Cooperation between countries, institutions and the private sector is proposed as the way forward, if the need for educational materials in Africa is ever to be met.

### Context of Educational Material Development in Africa

Many African countries have lost a lot of what was gained in education during and after the colonial era, partly because of the present climate of economic austerity and steep population increases, and because of the determined effort to remove all colonial relics (good or bad) from the face of the continent. Educational materials form one category of the gains that are fast being lost. Consequently, African countries are experiencing a decline in the general quality of education and lowering of standards.

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Education is a factor in development. Apart from the skilled manpower which it provides, an educated society provides the literate clients that are more likely to accept innovations and objectively use informed judgement to decide what to do with such innovations. And this is what is prevalently lacking in Africa, and in its turn, preventing development in many sectors, including education and the paraphernalia that go with it.

It has been estimated that over 60% of educational material requirement of Africa is imported, as compared to 27% in Latin America and 25% in Asian countries and that this trend will continue to the year 2000 (Cao Tri Hun, 1976). This situation is compounded by the fact that the youngest population in any region in the world is found in Sub-Saharan Africa. According to a recent World Bank report, one in three persons in this region is of primary or secondary school age; compared to one in five in Latin America and Asia, and one in six in the industrialized countries. This means that, in Africa, the burden of providing physical inputs of equipments, books, schools and teachers for an expanded education system falls on an adult population that is constantly shrinking.

The proportion of national recurrent expenditures going to education in African countries is very high. But education budgets in these same countries are almost entirely absorbed by staffing costs, leaving very little for development. It is reckoned in some countries that no more than 5% of the education budget is intended for development purposes, hence the acute shortage of educational materials experienced by these countries.

At the moment, hardly any industry exists in African countries which specialize in the venture of educational materials production. Any solution to the problem of lack of educational materials in Africa therefore will be largely inapplicable because of the lack of an efficient and dependable infrastructure. Distance education projects, for example, are likely to be the only viable means of dealing with the massive problems of access to secondary and post-secondary education. But even if the results of existing experiences in this area were disseminated, the idea is not likely to be implemented because of the lack of the required infrastructure including constant electricity, transportation and radio and telecommunications.

Moreover, there is a history of importation of textbooks, stationery and science and technology equipment, including electronic and audio-visual equipment in all African countries. And even though problems of compatibility, maintenance and

standardization have been encountered, a certain image of the structure and quality of these imported materials exists in the minds of teachers, parents and pupils. Consequently, materials and equipment produced in African countries are looked upon with a different eye. This negative attitude to inexpensive and locally produced educational materials is common.

In some countries, printing presses and other facilities for production of educational materials had been set up. The economic recession in these countries has however made it impossible to repair or replace these devices. In addition, the raw materials required for the operation of these facilities (paper, ink, oils,) are so expensive that installed facilities have been out of use by the establishment for which they were intended.

Some countries have established industries for the raw materials required for producing educational materials, but the capacity of these industries to satisfy the requirements of schools and other institutions is questionable. For example, Nigeria and Ethiopia now have paper mills, but the quality and quantity of paper produced by these mills for educational materials production falls short of the needs.

There are many countries in Africa with school-going population under one million children who nevertheless are desirous of producing educational materials relevant to their socio-economic, cultural and political setting. The hope in these countries is to discover efficient ways by which their needs could be satisfied locally, except that the educational market in such countries is too small. Overseas suppliers on the other hand are often preoccupied in the search for bigger markets. Their efforts therefore are geared more towards satisfying many different and sometimes bigger markets than what small African States can provide. In this way, the relevance sought by these countries is never attained.

In the non-formal education sector, the inadequacy of teaching-learning materials is still more acutely felt, especially for post-literacy programmes. Regional cooperation, which is often reported to be technically achieved in this field, is however underdeveloped. Certain countries, for example, publish texts in national languages which cover regions outside their borders without the neighbouring countries being associated with their production and use.

The system of education in some African countries has been subject to sporadic changes in the school curriculum. In



some countries, declarations have been made on abolition of an existing system-wide course of study or length of the primary sector "with immediate effect". The urgency of such changes (inspite of their good intentions) leaves little room for adequate preparation.

It appears from the above indications that the stage is yet to be set in several countries for the manufacture of appropriate materials. There are many countries which are actively searching for ways within their means to produce (locally and economically) materials suited to their educational objectives. These techniques should, within the financial constraints these countries are facing, make it possible to design, cheaply produce and distribute educational materials suited to their needs.

Local design and production still remain very low as a result of lack of nationals with skills, lack of the required infrastructure and equipment to undertake this very vital activity. Where they do exist, the materials used are often inappropriate. As a result, only a small number of centres produce country-specific educational materials.

### **The Types of Educational Materials Covered**

Educational materials are many and varied but shall in this volume refer to all concrete products used for the direct or indirect promotion of pupil-teacher interactions, to facilitate learning and the realisation of educational goals. They include:

- i) Textbooks (main learner-intended texts designed to meet requirements of specific curricula)
- ii) Accompaniments to textbooks (in the form of students workbooks, teachers guides, etc.)
- iii) Stationeries (required for intellectual activities as part of the learning process)
- iv) Non-text materials (in both audio and visual forms)
- v) Equipment and facilities designed for use in laboratory-type situations
- vi) Non-formal materials not primarily designed for use in formal school settings.

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The significance of educational materials today in the African education scene is such that educational institutions, reform projects and even governments are very anxious to do something about it. In some countries, sections of reform projects have undertaken the design and production of school equipment/teaching aids like beam balances, anemometers, weather vanes, etc. These are done in unorthodox ways, such as in the village technology unit of an educational reform project, all in the name of improvisation.

In the area of adult education, films have been made, illustrating the practice of certain crafts (screw-pine weaving, elephant grass basketry, etc.).

An unusual educational facility that seldom crosses the mind of educational planners, teachers and educationists in Africa is the land area on which some teaching-learning interactions take place. This is to be included in a definition of educational materials and resources. The acquisition of adequate land for practical subjects like agricultural science or physical education is as much an asset to teaching and learning in schools as a full kit for practical lessons in physics or chemistry. However, this type of educational material is little talked about or even sought until the facility becomes desperately scarce. A report from the Environmental Studies Section of the IPAR-Buea project in the South-West Province of Cameroon demonstrates the utility value of a plot of land as an educational facility as follows:

"Since the reform of primary school agriculture implies more than just an improvement in the field of agricultural practice, it was desirable to have an area on which to try out ideas on school agriculture and gain the experience necessary for school curriculum development. The plot allotted to IPAR-Buea at mile 17 round-about provides such an area of experimentation and demonstration".

This category of educational materials can in fact be used in different forms of school teaching. The plot of land at "mile 17 round-about" facilitates the conduct of experiments with classes as it will make it possible to teach a lesson, take the pupils out for practice and observation and teach a follow-up lesson immediately after the out-door activity.

## **Reasons for Undertaking Educational Materials Development**

The reasons for changing the type and form of education in African countries, and hence the materials required to conduct the process, are many and varied. In general, however, these reasons can be classified under one of three categories.

Firstly, there was the expansion of the system of education in many African countries after independence. The increase in the number of schools was accompanied by inadequate provisions in them, large numbers of unqualified teachers teaching subjects in which they had no specialised training and the inadequate provision of facilities and resources for teaching and learning.

Secondly, it became apparent from different assessments of the systems of education in relation to social and economic development in these countries, that the type of liberal arts training offered by the system and the academic grammar-school type curriculum inherited from the colonial era were not in line with manpower requirements. The need for change in school programmes was thus identified, so that these would reflect the needs, economic activities and resources of each country.

Thirdly, there was a concern for the recovery of the African's self pride, that had been destroyed by the assimilation of Western cultural values. This often took the form of establishing control of the school curriculum. It included demands to define valid knowledge for the African setting. The school curriculum was seen to have perpetuated Western cultural values which were not directly applicable to the African situation. One of the reasons for changes in schools was to remove such relics.

For these reasons, a reform movement in education began in independent Africa, mainly in the form of curriculum development. The decade 1965-1975 saw changes along the lines of wholesale transplantation of ideas and practices that had been initiated in the developed countries with the hope that genuine change was being achieved. Some of these, like the Nuffield Science Teaching Project, the School Council Materials from the United Kingdom, the Physical Science Study Committee, and Biological Science Study Committee Materials from the United States of America were brought into African schools in all shapes and forms. In some cases, overseas advisers to national initiatives on curriculum development recommended these materials as resources to the development

exercise. And where the adviser was strong enough, the new materials which were to be African in nature were only so on the surface. The philosophy of such materials was essentially that of the foreign source from which it was borrowed.

The above development was characterized by the production of no corresponding equipment or teaching aids to be used along with the new materials. Instead, kits manufactured overseas were recommended as accompaniments, initially as part of a grant package and later for sale. Fortunately, these materials and their matching equipment could not fulfil the requirements of most African countries and so were accordingly rejected.

The rejection of the above materials was followed by changes that took the form of a restructuring and which was characterized by emphasis on use of national languages, the promotion of education and productive work and local production of educational materials and equipment that truly reflect national aims and objectives.

The evolution of alternative educational structures in African countries was supported by a desire for local development, production, and dissemination of educational materials. In some cases, these materials formed the concrete evidence of the new structure and its philosophy. The procedures for developing new materials were very closely related to the changes that were made. Diversification of secondary school programmes came together with integration of school subjects. By integrating several traditional school subjects (e.g. History, Geography, Civics, etc.) to form a new area of study (Social Studies), more time was made available on the school timetable for the new and practically oriented disciplines like Accounting, Commercial Arithmetic, Clothing and Textiles, Foods and Nutrition, etc. These new subjects required educational materials different from those used for traditional subjects.

The procedures and types of materials that featured in this second phase of development of education in Africa varied from country to country but they included curriculum development, textbook publishing, adaptation of already published materials from a developed country, straightforward importation, manufacture of equipment and materials and the production of adult literacy readers and equipment.

## **Existing Educational Materials Development Initiatives**

In general, initiatives to develop and produce educational materials are evident in both government and non-governmental sectors and the extent of involvement by either or both sectors varies from country to country. Institutions and independent groups like subject associations sometimes take up the challenge. The way in which various forms of educational materials development and production take place around Africa, South of the Sahara is described below.

### ***Curriculum Development***

Curriculum development by government ministries of Education started in Africa in the mid-sixties, after the Addis Ababa Conference of Ministers of Education in 1961, where the relevance of the education provided in African countries was contested. African governments then undertook the task of developing new materials in a bid to making the education they were providing relevant. So the first attempts at educational material production was through such national government initiatives, although in most cases this was prompted by a donor agency.

However, the procedure adopted varied from assigning an existing division of the Ministry of Education to the task of establishment of a new unit within the Ministry or outside in a university institute. There are a few cases of separate national curriculum development centres being established.

In Cameroun, the reform project IPAR (Institut de pédagogie appliquée à vocation rurale) was given the responsibility of developing materials appropriate for the reform project in that country. The Bunumbu and Namutamba projects in Sierra Leone and Uganda, respectively, were set up as experimental reform projects with curriculum development components whose ultimate aim was the production of a national primary school curriculum package. In Benin, there is a division of the Ministry of Education, INFRE (Institut national pour la formation et la recherche en éducation) which undertakes development of educational materials. In Botswana, government conducts curriculum development through committees made of teachers, teachers college staff and Ministry officials. These committees are directly under the supervision of the Ministry of Education.

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Ethiopia has a statutory body to which a Curriculum Development Unit is attached, the Educational Materials Production and Distribution Agency (EMPDA) under the Ministry of Education for development and production of educational materials. In Madagascar, there is an established institution, CNAPMAP (Centre national de production de matériel pédagogique), responsible for the production of educational materials. The list continues but one feature which all of the established units have in common is that they primarily serve as curriculum development centres.

Educational material production efforts through curriculum development or agencies are often limited to the preparation of teachers guides, pupils workbooks and supplementary readers. There is often a neglect of non-text material such as, teaching aids and equipment. The exceptions to this oversight are Nigeria, Senegal, Mali, Mauritius, Ethiopia and Madagascar, where the focus on teaching aids is going along with curriculum development efforts.

In some African countries government delegates the responsibility of curriculum development and materials production to already established institutions and departments. In Nigeria, for instance, the National Educational Research and Development Council (NERDC) is given the responsibility for designing and developing appropriate curricula and textbooks for the country's primary, teacher training and, to some extent, secondary schools. NERDC is a merger of the former Nigerian educational Research Council (NERC), the Comparative Education Study and Adaptation Centre (CESAC), the National Book Development Council (NBDC) and the National Languages Centre (NLC). These institutions cooperate with publishers, teachers' associations and individual teachers to provide educational materials for the school system by local production and importation. The educational materials provided by these establishments and agencies include textbooks and their accompaniments (teachers guides and pupils textbooks, non-text innovative materials with their textual supplementary materials, science laboratory equipment and braille texts). The Ministry of Education in Sierra Leone delegated curriculum development to the University of Sierra Leone Institute of Education in 1968 but with the Ministry's officers carrying out some part of the development activities. The Ministry also has a

task force on textbook production and distribution which is located in the Institute of Education.

Zambia has a National Curriculum Development Centre charged with the responsibility of developing educational materials. The centre has a good visual aids section but this is hardly used by teachers. Materials developed by the Curriculum Development Centre are sent to a subsidiary of the Kenneth Kaunda Foundation, the National Education Company of Zambia which is in charge of the printing of educational materials. The books are then distributed to schools by the National Education Distribution Company of Zambia.

In Mozambique there is a National Institute for the Development of Education which is charged with the responsibility of studying the structure of the national system of education, taking into account Mozambique's socio-cultural and economic contexts. This agency also carries out the responsibility of generating educational materials. The preparation of these materials takes place in a curriculum development and a publishing department. The Ministry of Education has a firm for the distribution of school materials and this company is responsible for the acquisition of the printed books and their distribution throughout the country.

Lesotho has two acknowledged centres for the production of educational materials: the National Curriculum Development Centre and the Lesotho Distance Teaching Centre. For a long time educational institutions in Lesotho relied heavily on educational materials imported from other countries and institutions. The initial attempt to produce educational materials in Lesotho started as a regional effort by Botswana, Lesotho and Swaziland and these came up with textbooks in Mathematics and Science commonly referred to as the Boleswa series. The National Curriculum Development Centre which is responsible for the design of syllabuses and educational materials for primary and secondary schools, has now undertaken the production of textbooks and teachers' guides in some subject areas. In addition, the Lesotho Distance Teaching Centre produces educational materials, games and workbooks for youth and adults to develop their literacy and numeracy skills. This is usually done through pamphlets, radio programmes and communication support courses for field workers of government and non-governmental organizations. In keeping with its role as a correspondence institution, the Centre helps private candidates taking oversea examinations by providing

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correspondence courses and radio programmes. The Centre also produces printed materials for the in-service education of teachers at the National Teacher Training College.

Like Nigeria, the development, production and distribution of educational materials in the Island of Mauritius is a translation of government policy. The responsibility for curriculum development is that of the Mauritius Institute of Education, which has a curriculum development centre. A book production unit, with modern equipment, is attached to the curriculum development centre. The island also has a production unit created by the "Save the Children (Mauritius)". This unit specialises in the production of educational materials (including furniture), specially for the pre-primary sector. There is also the "Editions de l'Océan", which also acts as a link between the Curriculum Development Centre and the consumers in the three distribution points in the country.

Distance education is taken care of by the Mauritius College of the Air and the production of materials for educational radio and television is done by members of the Inspectorate, Curriculum Development Centre staff and practising teachers. The responsibility for development, production and dissemination of educational materials for the Asian languages lies with the Mahatma Gandhi Institute.

The above arrangements show that some collaborative efforts exist between institutions and organisations that are engaged in providing solutions to the problem of educational materials in these countries, as ministries of Education, curriculum development centres and institutes of Education are attacking the problem together. In the Gambia, the Curriculum Development Unit is located within the Ministry of Education whereas in Kenya the Institute of Education (charged with this same responsibility) is an entirely autonomous body that receives assignments from government.

Thus, in the countries referred to above curriculum development was the first step to educational materials production and took the form of workshops at which teachers and college lecturers prepared draft materials for trial in schools. Feed back from the trials were used to edit and further modify the materials for either direct publication or used as the basis for textbook preparation. The same procedure was followed by the Science Teachers Association of Nigeria (STAN) in their preparation of integrated Science materials. On the whole,



therefore, a lot of advances are being made in educational materials production through curriculum development efforts.

### ***Textbook Manufacture***

In many countries textbook manufacture was the second stage in the process of educational materials development and production. This stage has not been adequately reached by many African countries, mainly for the following reasons:

- a) lack of skilled authors and publishers;
- b) high cost of machinery and repairs;
- c) unavailability of software materials, in sufficient quantities;
- d) lack of skilled technicians in the printing presses.

As a result of this very few countries have undertaken projects in the textbook industry. Botswana, Kenya, Togo, Niger, Zaire, Mauritius and Lesotho depended on overseas publishers (and their local agents) for a very long time. The problems that were faced in these countries included:

- i) late arrival of books ordered and delays in their distribution;
- ii) books reflecting neither the culture nor the economic, technological or social aspirations of the country;
- ii) high duties on importation of printed texts or films for plate-making;
- iv) in the absence of correct data or projections of book requirements, the orders always fell short of needs.

Textbook manufacture is not entirely new in African countries. As early as 1964 a regional textbook centre agreement was reached between Cameroun, Gabon, Tchad and Central African Republic for the purpose of publishing, printing, and distributing textbooks and related educational materials in Central West Africa. Even before this time a textbook production unit is reported to have been established in the Department of Research and Curriculum Development of the Ministry of Education in Ethiopia. This Unit became part of the Educational Materials Production and Distribution Agency in 1975/76 and undertook planning, preparing and printing of textbooks, reference books and others related educational materials such as charts, maps, wall pictures etc.

In 1970, the Regional Textbook Centre in Cameroon ceased activities with Gabon, Tchad and Central African Republic due to lack of capacity. It must be noted that this was the first attempt at sub-regional cooperation among African nations in the business of educational materials development, production and distribution. In 1974 activities in the centre were strengthened, as a result of the addition of two UNESCO experts for a two year period. Up to 1978 the centre was producing and publishing textbooks for the secondary system, in addition to other educational materials that were required by the reform of elementary schools in Cameroon.

A similar cooperation agreement started between Sierra Leone, Liberia and later the Republic of Guinea, which were members of the Mano-River Union. A curriculum and book development project was undertaken by the three countries as a major sub-regional development programme. Activities of this programme in the areas of curriculum development and book production came to a start in the late 1970's. However, no books were published and the individual countries have now continued with their national programmes in curriculum renewal and textbook manufacture.

In some countries, textbook development has been promoted by government policies. As a result of a declaration in the 1981-85 Nigerian national development plan all textbooks at primary and secondary levels and 50% of books for tertiary level institutions should be produced locally. Many textbooks used in Nigerian educational institutions are now locally produced. The fifty-two local publishing houses are thus in full-scale production of books.

In Kenya and Ethiopia textbook production is the responsibility of parastatals - the Jomo Kenyatta Foundation of Kenya and the Educational Materials Production and Distribution Agency in Ethiopia.

The situation of tertiary level materials could perhaps be best tackled by the Nigerian strategy by which the NERDC has a scheme in which specialists in technical /professional disciplines come to together and develop books for the tertiary level. This will ensure relevance and availability of books for the tertiary level.

The situation about textbook manufacture in Africa, as can be deduced from the above is that there are many cases of private and national initiatives but only isolated cases of sub-

regional cooperation. In cases where this has been established there have been problems to the point that only short-term progress has been achieved.

### **Importation and Adaptation of Educational Materials**

This method of acquiring educational materials is used in almost all African countries. In most countries importation is restricted to senior secondary and tertiary level textbook and scientific equipment. In Kenya, Nigeria and Ethiopia importation of educational materials is limited to advanced texts and equipment. The several textbook development centres in the countries are given the responsibility of importation and distribution of textbooks and they are allowed to adapt imported texts to local requirements because the work involved in planning and preparing an entirely new course is very considerable and involves large sums of money. In cases where adaptation has meant translation, considerable problems of expertise have been experienced.

In some countries, when the demand for an imported text or other educational material rises above a certain level, the book development centre or equipment production agency is permitted to request local publication or manufacture of the particular book or equipment. Even though permission has been difficult to obtain from overseas agencies, the practice is certainly on in some countries.

The practice of adaptation or importation of educational materials is certainly not the wish of any African country, as it defeats the search for relevance and self-reliance. However, this approach has been found to be the best compromise in the circumstances that some countries find themselves.

### **Manufacture of School Equipment**

Like textbook manufacture, some advances have been made in the production of school science equipment and teaching aids, a development which unfortunately did not always form part of the curriculum development efforts.

All around Africa, several attempts have been made at manufacturing school science equipment, but only a few of these have resulted in mass production for use in schools. Some centers, like the Curriculum Development and Instructional Materials Construction Unit (CUDIMAC) of the University of

Nigeria, Nsukka, and the Science Curriculum Development Centre at Njala University College in Sierra Leone, equipped students with the skills of being resourceful for teaching purposes using the immediate and local environment.

After these initial efforts in the various countries, several agencies have now emerged and are in the business of science equipment production. In Nigeria there is a National Educational Technology Centre (NETC) established by the Federal Government. There are also educational resource centres in each state for the design, development and production of prototypes for use in schools. Other countries that are quite advanced in the area of school science equipment production include Madagascar and Ethiopia. In Madagascar there is the National Teaching Materials Production Centre (CNAPMAP) which was established by decree in 1976. This centre has several workshops (machines, electrical and general fitting) and is capable of manufacturing a wide range of scientific equipment. There are also facilities for training teachers in the use of scientific equipment and their minor repairs and maintenance.

In Ethiopia, like Nigeria and Madagascar, attention is paid to maintenance and repair of educational materials because this happens to be an area in which most African countries are seriously handicapped. In Ethiopia, Nigeria and Madagascar the curriculum development unit (including textbook manufacture) and educational materials production centre are under the same roof for obvious reasons. Equipment requirement of a course, as suggested in a textbook, can be more easily communicated to the equipment production division of an institute of education if they are under the same roof or management than if they are not.

The manufacture of science-equipment and other non-text educational materials provides fertile grounds for private and even institutional initiatives. This is because these materials are standard and they need not have national prescriptions to satisfy. For instance, a 25 cm<sup>3</sup> pipette can be used in volumetric analysis in any course in chemistry anywhere in the world whether for schools in the Republic of Korea or in Equatorial Guinea. However, the evidence available indicates little private sector or institutional initiative in the production of science equipment in the African continent. In the Francophone West African States of Senegal and Mali a lot of effort is being made to manufacture simple but absolutely essential equipment for science teaching. Only by having science and other educational equipment

produced locally can the relevance sought from an educational system be realistically achieved. Having textbooks produced in Africa and the equipment and materials to be used ordered from abroad would not have solved the problem of relevance or self-pride. Indeed, the use of locally produced apparatus along with books by African authors would be most rewarding.

### **Materials for Adult Literacy Education**

The development and production of this category of educational materials deserves special consideration partly because of the current emphasis on adult literacy in almost all the African countries and partly because of the uniqueness of these materials in the educational scene. In all African countries South of the Sahara there is a massive campaign against illiteracy in pursuance of the United Nations declaration of its total eradication by the year 2000. Accordingly, huge quantities of educational materials are being produced for this purpose.

Distance teaching programmes in Lesotho and Mauritius are aimed at achieving adult literacy, in addition to the formal sector which the programmes also serve. In Ethiopia, Kenya and Tanzania the use of African languages in business and education is steadily increasing. Furthermore the African nature of the languages used in the campaign urges many ordinary people to want to learn to read and write. In Ethiopia, tremendous efforts are made in the production of non-textual educational materials (e.g. blackboards, chalks etc) for the literacy programme and the formal school system. EMPDA works with the Department of Adult Education in the Ministry of Education in publishing books and readers for use in literacy work. In this way a regular literacy programme is conducted in that country. It is reported in an unpublished document that about 120 titles had been published by 1983 amounting to about seven million copies of adult literacy books. Primers, follow-up books, instructional guides, audio and visual materials are manufactured in the national language, Amharic. Similarly, Sierra Leone, Togo, Benin, Cameroun, Botswana, Mali and Tanzania have established systems of adult education and the materials used in each of these countries are produced locally.

Adult education is one area in which institutional and private initiatives are on. Several non-governmental organisations are involved in adult education programmes in African countries (e.g. CUSO, CARE, VSO, Planned International

DVV of the Federal Republic of Germany, etc). The approaches by these agencies may differ but their end in view is the same - to make more Africans literate so as to improve their life's chances. Some NGOs collect information on items that have an African taste and undertake the printing of publishable materials at their headquarters overseas to overcome the problem of machinery and other facilities that will improve the quality of the final product.

In all cases of NGO involvement in adult education programmes these organizations produce their own materials in collaboration with local agencies. In Sierra Leone, the Bunumbu Press and Provincial Literature Bureau undertake a lot of work for these agencies.

A third agent in adult literacy work is made up of the education reform project in different African countries (Bunumbu in Sierra Leone, IPAR in Cameroun, the Namutamba in Uganda, Primary Education Reform, MTUU in Tanzania, etc). These reform projects have adult education components which are sometimes given equal emphasis as mainstream schooling.

Unfortunately, there have been very few cases of regional cooperation among agencies. The African Association for Literacy and Adult Education (ALAE) is perhaps the only well established and functioning cooperation network of literacy workers in the continent. Materials prepared in one country in the same language are not simply adopted and used in the neighbouring country. Each country has several different and uncoordinated projects being pursued simultaneously. In almost all cases different orthographies are used in writing the same language in the countries. The Tanzanian experience in the near eradication of illiteracy ((about 10% illiterates) would have served Kenya, Uganda, Malawi, Zambia and the most of other Southern African countries. Regional or sub-regional cooperation in adult literacy work is absolutely essential. National governments will cut down on costs by cooperating with neighbouring countries in this and the other centres described in this document. If this is done adult literacy and the other educational materials discussed above will become the bonds of association between neighbouring African States and they in turn will enjoy priority in development efforts.

## **Persistent Problems**

The production of educational materials in Africa has been handicapped by a number of problems which have consequently affected the impact of such materials on the systems of education they were intended to improve. One of these problems is the lack of capacity of the existing facilities in the different countries to cope with the increasing demands for educational materials due to increases in school enrolment. In the prevailing economic recession the machinery and equipment, for instance, that were bought to set up units for educational materials production can neither be replaced nor repaired. All the countries that were able to set up printing presses, workshops and consequently book development councils or centres and material production and distribution agencies are known to be experiencing this problem. Educational institutions, in their turn, are not receiving adequate supplies of materials and equipment.

In some countries like Benin, Togo, Botswana, Kenya, Sierra Leone and Mauritius inputs are still being made into educational materials production by overseas governments and international organizations especially at the senior secondary and tertiary levels. Some of these are in the form of capital investments (e.g. machinery, manpower etc) but the repair costs of these (retraining in the case of manpower to keep abreast with new technologies) will be too high for the recipients.

Some of the educational materials production centres set up in Africa have neither the ability nor the machinery to construct standardized science and other educational materials. Consequently, advanced science equipment have continued to be ordered from overseas. At the higher levels of education equipment for science teaching must be standardized to give precise measurements. At this level teacher-made or improvised materials are not good enough. The production of these graduated equipments requires precision machinery.

The market for educational materials and equipment in individual countries is small. Thus, the publication of textbooks is always done at a loss, if the textbook is produced specifically for local consumption. Projects that have been designed and executed along these lines have incurred such losses at the production stage that printers have had to discontinue. The Core Course Integrated Science Project (CCIS) in Sierra Leone, as a case in point, was discontinued by the Sierra Leone's Government Printers even though other countries were ready to

use the materials. There are, of course, many other projects like CCIS which have disappeared from the educational scene because of lack of a large enough market to make the proposition viable. The need for a large market is inescapable for an undertaking in educational materials production.

In literacy work (in several African countries) the primers produced have been very useful and successful in helping many people to acquire basic literacy. The problem across the continent, however, is the provision of post-literacy materials to prevent the new literate from reverting to illiteracy. The production of reading materials for the neo-literates is a requirement if the effect of adult literacy programmes is to last long and possibly for ever.

The distribution of educational materials produced has encountered difficulties in many countries because of their low infrastructural development. As a result, in some countries, agencies for textbook production for the formal sector have preferred to leave the production and distribution of adult education materials to the Ministry of Education Division/Directorate of Adult Education. The roads to many parts of the countries are hardly motorable, thereby making large consignments of materials difficult to reach the intended clients. In some countries where a distribution machinery has been set up, the on-the-ground implementation of this machinery has produced contradictory results. Instances of educational materials being found in the district distribution manager's office gathering dust are reported. Losses, in huge quantities, of educational materials at airports, seaports and warehouses are common.

On the whole, therefore although awareness seems to have been created in governmental circles and the private sector about the importance of educational materials, the attempts made at production in Africa can be seen as the start of a long and difficult venture. There is an urgent need for sustained efforts to increase the gains expected from the venture. Efforts are required particularly in the areas of inputs such as manpower and machinery. The private sector and government must invest more in fertile grounds like equipment production (including the acquisition of heavy duty equipment for production centres and the manpower to operate, repair and maintain them). The promotion of regional cooperation for production and standardization of educational materials will go a long way to



improving the situation. In this way the size of the markets for which these materials are produced will also be enlarged.

It must be reaffirmed that education is a necessary and an intrinsic complement to the development of any nation. However, it only assumes this role when it is appropriately provided using the inputs it requires. As an element of development its progress in Africa must be pursued with all the vigour. In the educational materials industry, results are awaited for immediate application. Every effort should therefore be made to make an improvement in the deteriorating conditions of our educational systems which some have called "All our future".

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**SECTION II**  
**EXAMPLES OF NATIONAL INITIATIVES**

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## Chapter Two

### **Mechanisms for the Development, Production and Dissemination of Educational Materials: The Ethiopian Experience**

*Kebbede FRIESEN BET \**

Ethiopia is a country situated in the horn of Africa. It covers an area of 1,223,600 square kilometers. It has a population of 46 million, and is the most populous country in Sub-Saharan Africa, after Nigeria.

The Government is committed to continued development of educational services at all levels from kindergarten to higher education.

The range of education and training being handled and developed by the Government covers an extensive programme of adult education and skill training as well as higher education and post-graduate studies to meet manpower needs for economic development.

The school census from 1973/74 to 1985/86 shows that enrolments in primary, lower secondary and higher secondary schools grew by 185%, 257%, and 260%, respectively since the popular Ethiopian revolution. Important measures have been taken to provide education at first and second levels equitably throughout the country.

Many associations have been created since 1974, and these have become very important instruments for economic, social and political development. Peasant and urban dwellers associations have been mobilized to give support in organization, provision and operation of many aspects of education and training. The success of the mass literacy campaign in Ethiopia, which has been going on since 1980, was mainly due to the active participation of the people in general

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\* General Manager, Educational Materials Production and Distribution Agency, Addis Ababa, Ethiopia.

and the financial, material and manpower contribution of the various mass associations. In 1974, the literacy rate was only 7% but now it has reached a level of 70.9%.

Third-level education and training, which are vital for professional and technical manpower, have expanded markedly.

Formal schooling in Ethiopia comprises a six-grade primary cycle, two years junior secondary school and four years of senior secondary school. At present, a new curriculum is being introduced in selected experimental schools. Based on the outcome of the experimental programme, it is planned to move from 6-2-4 system to an 8-2-2 structure. At the post-secondary level, diplomas are granted after two or three years of study and degree programmes take four or more years.

### **National Machinery for Developing, Producing and Distributing Educational Materials**

To give reasonably good quality education, the government is doing its best to provide material inputs in sufficient quantities and of adequate quality to meet the needs of the education system. To shoulder this important responsibility, the government has established the Educational Materials Production and Distribution Agency (EMPDA). EMPDA is an autonomous agency of the Ministry of Education (MOE). It was established by Government Proclamation No. 266/1984. Prior to the proclamation, the agency had functioned for more than ten years, simply as a curriculum department within the Ministry of Education.

### **Objectives, Powers and Duties of the Agency**

The objective of the Agency is to prepare, produce, procure, distribute and maintain educational materials and carry out research related to educational materials production and distribution.

Some of the powers and duties granted to the Agency are as follows:

- prepare and publish or cause the publication of students' textbooks, teachers' guides, reference materials, charts and maps;

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- produce or cause the production of science, technical vocational and other educational equipment; repair and maintain same;
  - produce school furniture;
  - produce chalk for schools and other institutions of learning;
  - produce materials for kindergartens and for teaching music, arts and physical education;
  - purchase local and from abroad school equipment and materials;
  - carry out research necessary for the production of materials and equipment for schools;
  - distribute equipment and materials to schools;
  - charge costs and fees;
  - enter into contract;
  - sue and be sued in its own name;
  - own, procure, mortgage; sell, exchange property with the purpose of attaining its objectives;
  - discharge such other functions as may be necessary to the attainment of its objective.

## **Organization of EMPDA**

EMPDA is headed by a General Manager, who is directly responsible to the Minister of Education.

The Agency has three main departments.

### ***1. The Textbook Publication Department***

This is responsible for the publication of kindergarten, primary and secondary school textbooks, reading materials, teachers guides, etc. As things now stand (1988), textbooks and other written materials are written by the National Curriculum Development Center (NCDC), edited, designed, illustrated and produced in trial form by the EMPDA. These are then tested in experimental schools, revised by the NCDC, and finally produced and distributed by EMPDA for general use by the intended institutions. This practice has been followed for a long time and now there is an agreement that it should be changed, so that NCDC would give adequate attention to research, revising and designing the curriculum, establishing new standards of educational facilities and practices, evaluating and

controlling educational equipment and materials, so as to meet the requirements stipulated in the curriculum.

As a result of this change, EMPDA is now getting ready to take over and operate as a full fledged publishing house for the Ministry of Education.

The Publication Department of EMPDA is also responsible for giving technical advice on and the production of national literacy campaign books and many different titles of reading materials for adults. To discharge its responsibilities, the Publication department has the support of two divisions - the Editorial division and the Production division. The production division has a big and modern printing press. Textbooks and other publications needed for schools in Ethiopia are all printed by EMPDA and other factories in the country. The production of textbooks has increased steadily from year to year. As it is shown in Table I, the number of various kinds of books printed in 13 years for schools and adult literacy programmes is 113, 119, 172.

**Table I. Number of textbooks printed from  
1974/75 - 1986/87**

Year	School Textbooks	Adult Literacy Campaign	Experimental Textbooks
1974/75	3.254.000	965.000	500.000
1975/76	768.000	996.000	500.000
1976/77	3.150.000	2.262.000	700.000
1977/78	5.338.000	2.177.000	800.000
1978/79	5.380.000	4.704.000	94.000
1979/80	3.382.000	8.861.000	700.000
1980/81	7.532.000	4.299.000	386.150
1981/82	4.590.000	4.236.000	546.599
1982/83	2.234.000	4.754.000	657.181
1983/84	4.505.000	4.936.000	1.555.000
1984/85	2.614.000	5.432.000	1.200.000
1985/86	4.600.000	3.806.000	1.537.492
1986/87	5.567.000	3.300.350	300.000
	<hr/> 52.914.000	<hr/> 50.728.350	<hr/> 9.476.822

## **2. The Science, Technical and Vocational Equipment Production Department**

EMPDA is, in addition to functioning as a publishing house, also responsible for the production of school furniture, chalk, primary school science kits and the maintenance of school equipment throughout the country. In its long range plan, it has many other projects to implement in order to increase its activities of production of equipment.

The science, technical and vocational equipment production department of EMPDA has, in addition to a chalk production unit, a furniture production unit, a science kits production center in Addis Ababa and 14 furniture production units throughout the country.

The chalk output is quite adequate to satisfy the present demand. However, to cope with the needs of the increasing number of schools and students, the present production unit is being expanded to raise its production capacity from 500,000 - 600,000 gross of chalk, to 2,600,000 gross of chalk every year.

**Table II: Chalk Production Output**

<b>Year</b>	<b>Gross Output</b>
1975/76	31.091
1976/77	39.544
1977/78	62.557
1978/79	110.653
1979/80	204.863
1980/81	600.000
1981/82	600.000
1982/83	500.000
1983/84	500.000
1984/85	523.476
1985/86	500.000
1986/87	500.000
<b>TOTAL</b>	<b>4.172.184</b>

The Science Kits Production Center started as a modest and small production unit with a few machines and workers. Now it has been strengthened in production, machines and personnel, and its annual output has grown up from 100 kits to 2,600 kits per year. Its production is limited to kits for primary schools, but the potential for producing some selected items for,



at least, the junior secondary schools is there. There is a plan to work towards that end after gaining more experience and giving more training to the technicians at the center.

EMPDA has 14 furniture production units located in 14 regions and one unit in Addis Ababa. They produce school furniture of all types including classroom and office furniture. They operate below capacity from time to time due to shortage of raw materials in the country, especially timber. They import items like round and square pipes, angle iron, etc. It has been realized that shortage of raw materials is an acute problem at present, and has drawn the attention of all those concerned to find ways and means of bringing the problem under control.

**Table III: Furniture Production Output**

<b>Year</b>	<b>Number of pieces</b>
1975/76	1.706
1976/77	2.380
1977/78	3.234
1978/79	11.389
1979/80	324.866
1980/81	242.111
1981/82	345.393
1982/83	194.230
1983/84	143.205
1984/85	130.891
1985/86	81.968
	1.533.964
<b>TOTAL</b>	

### ***3. Procurement and Distribution Department***

The Procurement and Distribution Department is one of the three major departments within EMPDA. It has a wide range of activities such as procuring equipment and materials from abroad and from within the country, storing and distributing equipment and materials to the regional education offices and schools.

To shoulder its responsibilities, it is organized to have the support of three divisions - foreign and local procurement division, warehouse division, distribution division.

The department has a fleet of trucks to transport books and equipment to beneficiary schools and institutions. Books are usually transported by the Department to the regional education offices. Transporting from the regional stores to the schools is the responsibility of the regional education offices. From the central warehouse of EMPEDA in Addis Ababa, books are distributed to Regional Education Officers (REOs) according to orders placed by REOs after consultation with the schools within their jurisdiction. The REOs then act as regional distributors and supply the schools with their requirements. Once books are in the schools, they become school property, and are lent to the students through the teachers subject to a nominal handling charge of 1-2 Birr (US\$ 0.50 = 1.00) for the entire set of books prescribed for their grade.

Other equipment, like machines, wood, workshop, metal workshop, laboratory equipment, etc. that need the skills and proper handling of technicians to install and test, are usually transported by the Distribution Division and installed by qualified technicians from the Equipment Maintenance Division of EMPDA.

## **Other Sources of Instructional Materials Provision**

Schools receive, in addition to what is provided by EMPDA, instructional materials from different sources which are not directly linked to EMPDA, but are under the supervision and guidance of other departments of the Ministry of Education. The following are three of the sources from which schools get additional educational materials:

### **1. *Awraja Pedagogical Center (APC)***

The APCs have several educational objectives to accomplish. One of their objectives is to "develop teaching materials that will serve as models on the basis of which teachers will be able to prepare their own materials".

By 1988, there were 106 such centers, throughout the country. The APCs produce various types of useful teaching aids such as models, pictures, posters, simple maps, globes, etc., out

of the materials available in the schools and communities, based on the curriculum objectives. The APCs give training to teachers in their provinces in the preparation and production of simple teaching aids. Many of the Awrajas (Provinces) have now established APC school branches that would serve as a link between the school and the APC.

## **2. The Mass Media**

The Ministry of Education has radio programme services for schools. The radio programme activities are handled by the Department of Educational Mass media (DEMM). The DEMM of the Ministry of Education has 11 radio broadcasting stations located in different parts of the country.

The DEMM structure extends from the central office in Addis Ababa, through media supervisors in each regional and awraja (provincial) education office to media teachers in each primary school (see Appendix II).

To carry out its responsibilities, DEMM has the support of five main divisions:

- administrative services division;
- radio programme division;
- television division;
- engineering and technical services division;
- research and training services division.

The current major activities are production of radio programmes to support adult education, primary school education, secondary level distance education and primary teacher training.

Over 90% of all primary schools in Ethiopia receive radio broadcasts from DEMM on a weekly basis through the eleven medium wave regional transmitting stations. These primary school broadcasts are in four subject areas: Amharic, English, Science and Social Studies. For each subject, there are 26 broadcasts per year for each grade.

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## **Major Needs in Terms of Educational Materials**

After the Ethiopian revolution, many important steps were taken to increase the production output of textbooks so that pupils at primary level and students in the secondary schools could get the minimum textbooks that are required for the different grades in the education ladder. However, in spite of all the efforts so far made, it has not been possible to provide each child with a book in every subject to make learning and teaching effective. The success achieved in this area is providing one book to two children, or in some cases three. Books are given to pupils and students on loan to be returned to the school after the end of the academic year. The life span of a book ranges from 2 to 5 years depending on the grade level where the book is to be used. Books for grades one and two are expected to have a life span of only two years, while books for grades three and above have to give a minimum of three years of service. Teachers' guides are expected to serve at least five years.

The provision of teaching materials to children of pre-primary institutions is almost non-existent. There is no government budget allocation for producing educational materials for children at pre-primary level since such institutions are mainly privately owned. However, the Ministry of Education is responsible for the development of education and training at all levels in the country. Because of this, the Ministry of Education trains teachers for kindergartens and through the EMPDA, produces teaching aids and children's books whenever there is an outside financial assistance for this purpose. Such an assistance is, however, sporadic, piecemeal and by no means adequate to satisfy the demand. Hence, a comprehensive and systematic approach of provision of educational materials to pre-primary children is not there at the moment.

The preparation and production of technical/vocational education materials are far from satisfactory. Most of the textbooks used in the technical schools are imported books from different publishers abroad. This is an area that needs the close attention of the Ministry of Education in terms of making the materials relevant to the Ethiopian situation.

The teacher training institutes (TTIs) give one year training to students who have completed 12 years of education to teach in the primary schools. The educational materials that they use are mainly related to the contents of education at the primary

schools. Such professional subjects as psychology, child growth and development, philosophy, etc., are taught with the help of foreign reference materials. No educational materials have been developed locally in these fields for use by the TTIs. This is again another area of concern that needs attention in the future.

In the non-formal/adult education area, a great deal of effort has been made to prepare, produce and distribute educational materials for the on-going literacy campaign programme in the country, and relevant reading materials are written and distributed to the thousands of reading rooms throughout the country for use by the new literates.

To create more interest in reading in the new literates, there is still a need to look for authors who have the desire for, and the interest in writing relevant and interesting materials for adults.

Almost all educational materials for post-secondary education are imported materials. There may be a few professors and lecturers who have attempted to write textbooks in their fields for use by their students, but such attempts are exceptions and do not usually happen.

The national language - Amharic - is used as medium of instruction in the primary grades (1-6). Textbooks are written in Amharic and made available to pupils in these grades.

Textbooks for junior and senior secondary schools (7-8 and 9-12) on the other hand are written in English since the medium of instruction in these grades is still English. In the near future, there is a plan to shift from English, even in these grades, to Amharic.

The literacy campaign programme is conducted in 15 different local languages. Many reading materials have been written in these languages since the literacy campaign started.

Equipment like laboratory-material for high schools and technical institutions as well as higher education will continue to be imported from abroad. Local production should aim at satisfying primary school needs first. Secondary level schools and higher educational institutions are so few in number in Ethiopia that attempting to produce expensive and sophisticated equipment for these institutions will be uneconomical and unwise at present.

The national educational materials development trend in Ethiopia is to gradually work towards being self-sufficient at least in certain major development areas.

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## **On-going Efforts to Meet Current Needs**

As things now stand, there is a long way to go for Ethiopia to reach a stage of being self-sufficient in the provision of all the educational materials it needs for schools, colleges and universities. For many years to come, the realities of the stages of development would force Ethiopia to, somehow, rely on importation of certain materials like sophisticated equipment for science laboratories, metal and wood workshop machines, etc., but at the same time, she should aim at being partially or wholly self-sufficient at least in certain selected areas of production. So far, Ethiopia has shown, more or less satisfactory, results in the production of simple items, like science equipment for primary schools and textbooks for primary and secondary schools, chalk for the entire school system, etc. This domestic effort in the production of educational materials will eventually promote self-sufficiency. It is in view of this fact that the government has established the Educational Materials Production and Distribution Agency (EMPDA).

Peasants and urban dwellers associations raise millions of Birr (US \$ 1.00 = 2.07 Birr) each year to equip and furnish schools. The literacy campaign programme is conducted with a large amount of funds allocated to it by these associations. Workers, government employees, the youth associations and women's associations also contribute money from time to time for the literacy campaign effort.

Schools also take initiatives in preparing teaching aids for their own use in the classrooms and for literacy campaign programme based on the assistance and guidance they get from the APCs.

## **Impact of National Efforts**

The educational materials production effort in Ethiopia by EMPDA, DEMM, APCs and schools as well as different mass associations has had a major impact.

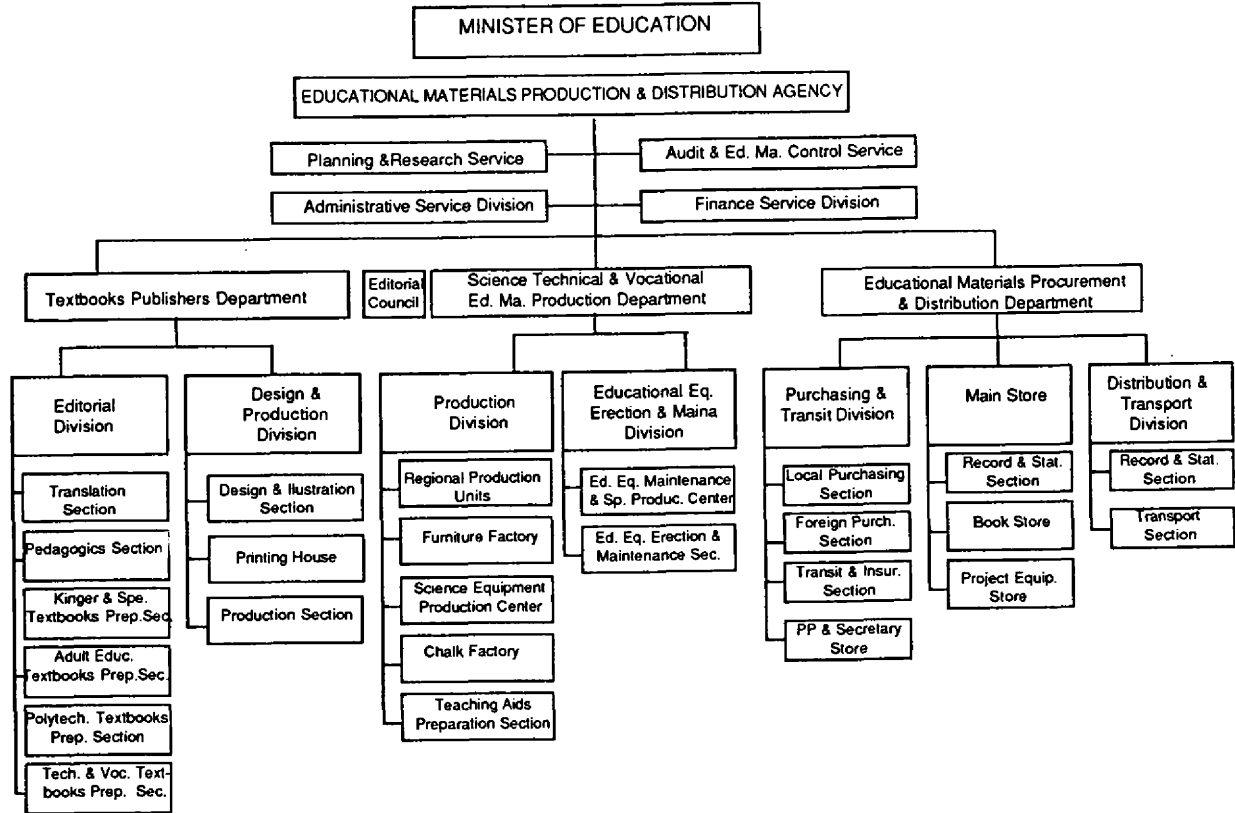
One impact has been the interest generated in education by adults. Schools have become attractive centers of learning. The provision of relatively suitable textbooks and teaching aids to the schools has improved the efficiency of learning of pupils and students. Books written in different national languages for adults

have promoted cultural consciousness, and have increased the efficiency with which they learn as well.

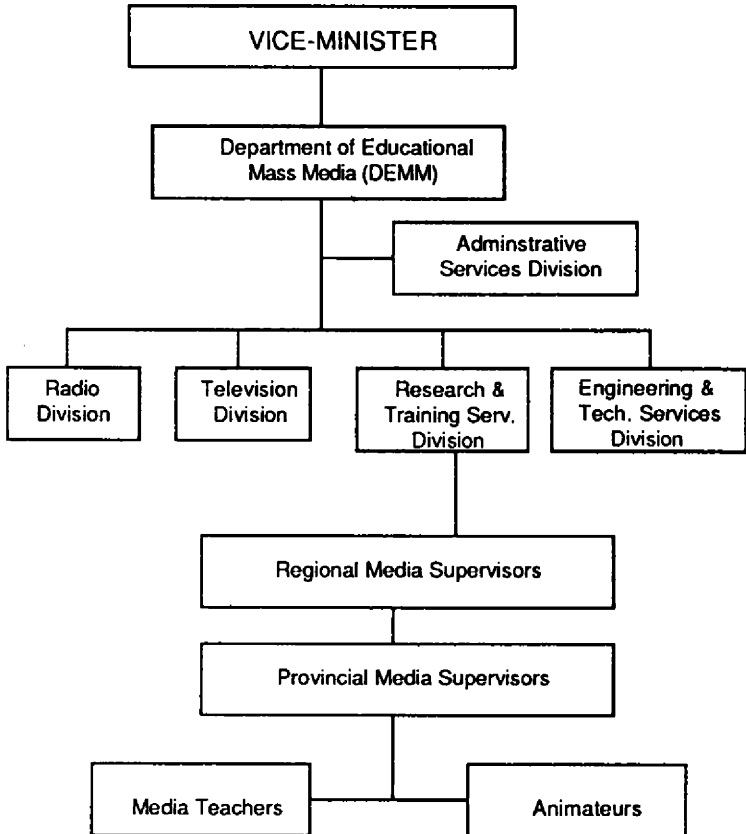
In spite of these achievements there is always room for improvement. Most of the educational materials the schools get are basic textbooks and are not available in variety. There is usually one book for each subject of a particular grade, and no alternative to choose from. The same holds true of books for adults - no varieties of books of interest to the new literates. To improve the situation, authors should be encouraged to write books on various school subjects based on the curriculum so that learners would have alternative materials to choose from or read as many books as possible to enrich their knowledges from ideas and concepts they might get from books of different authors. Adults need books and other materials of various titles and contents, that are interesting and attractive enough to stimulate the desire to read more and more books.

Nevertheless, getting competent authors is not easy, and when some are available, they may usually be school teachers. Most of the time, they are expected to write textbooks with very little or no incentive to their work. Such an approach cannot bring satisfactory results. To attract potential writers to authorship, generous reward should be given for good manuscripts on royalty or commission basis.

## ANNEX 1

**EMPDA ORGANISATIONAL STRUCTURE**



**ANNEX 2****ORGANIZATIONAL STRUCTURE OF THE DEPARTMENT OF EDUCATIONAL MASS MEDIA**

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## Chapter Three

### **The Lesotho Distance Teaching Centre: its Contribution to the Development and Production of Didactic Materials**

*Mapitso T. SEKOATI\**

Traditionally, the Basotho have always had an established form of information education that was oriented towards culture and the acquisition of practical skills by men and women who needed these for survival in their communities. The skills acquired by each of the two sexes were not always the same, reflecting the roles they would play in the division of labour as existed then and which is still widely accepted today. Alongside the informal education that took place at home, in the fields and elsewhere, was the traditional formal education (initiation school) that served to reinforce the informal system. Traditional education was compulsory, free, and there were no drop-outs from this system, nor was there a shortage of teachers and teaching facilities.

With the arrival of the European missionaries in the 19<sup>th</sup> century, came the establishment of European-style formal schools which have mostly replaced the traditional type of school. The early schools focussed its teachings on the acquisition of literacy, on Bible studies, practical skills and survival in a Christian community.

After Lesotho became independent from Great Britain in 1966, the national government decided to restructure the education system so that it would be geared towards the country's economic development. Since 1966, the number of schools as well as enrolment in schools have increased enormously.

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\* Lesotho Distance Teaching Centre, Maseru, Lesotho.

The educational system of Lesotho is organised into programmes of early childhood education, special education, primary education, secondary education, teacher education, vocational and technical education and non-formal education. These seven programmes are supported by service institutions which include the National Curriculum Development Centre (NCDC), the Instructional Materials Resource Centre (IMRC) and the Lesotho Distance Teaching Centre (LDTC), which are directly involved with the production of educational materials.

The NCDC has personnel responsible for designing curriculum content for different subjects offered in primary and secondary schools. Each office operates through subject specialists and panels comprised of subject specialists, teachers and representatives of relevant Ministries and organizations. The NCDC is responsible for designing and reviewing syllabi and producing or designing educational materials.

Most of these materials are printed at IMRC which has printing and audio-visual facilities that serve the whole Ministry of Education. The Lesotho Distance Teaching Centre, which is a department of the Ministry of Education, also has printing and recording studio facilities. But these facilities are mainly used to assist correspondence and non-formal education programmes.

The activities of these educational programmes and service departments are guided by the national education policy which requires that every Mosotho be provided with some kind of education that will make him/her a responsible and useful citizen in the country through ensuring that:

- every child is provided with the opportunity to complete primary education;
- non-formal education is made available to all those who have not had access to education through schools, as well as those who need to acquire new skills or to upgrade their skills in various occupations and vocations;
- individuals are equipped with appropriate occupational, technical and managerial skills for socio-economic development;
- in accordance with the country's requirements for development, greater attention is given to scientific thinking, problem solving and technical skills for the improvement of living conditions;

- cultural values and activities compatible with individual and social development are incorporated into educational programmes; emphasis being placed on the use of Sesotho, the mother tongue, in the lower primary levels and the role of the family and community in school activities be expanded;
- continuing education is provided at all levels of the educational system through non-formal education programmes in literacy, numeracy, basic skills in agriculture, vocational training, industry, business, etc.;
- training is oriented towards self-reliance and production<sup>1</sup>.

Recent seminars to clarify the national education policy have re-emphasised these statements. It is fitting and proper, therefore, that the production of educational materials or the importation or borrowing of materials from other institutions/countries should fit in with such a policy.

The development and production of educational materials by a non-formal education programme, the Lesotho Distance Teaching Centre, is the focus of this chapter. The contributions of this centre to educational materials development and production is a significant input into the country's educational machinery and presents a unique situation of an educational programme producing materials for its own sustenance.

## **Experience in the Production of Education Materials**

### ***1. The National Curriculum Development Centre***

Until recently, educational institutions in Lesotho had relied heavily on educational materials imported from other countries and institutions. Initial efforts to produce materials by national experts and for the national education system started as a regional effort by Botswana, Lesotho and Swaziland and these came up with textbooks in, for example, Mathematics and Science, commonly referred to as the "Boleswa series" (short for Botswana, Lesotho and Swaziland series). While the three countries still cooperate in issues related to education, changes in syllabi and curricula in the three countries have led to Lesotho

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<sup>1</sup>The Education Survey Report of the Task Force, 1982.

having to produce educational materials that are appropriate and relevant to its own syllabi and curricula.

The non-formal sector was neglected by these attempts until the creation of the Lesotho Distance Teaching Centre.

The National Curriculum Development Centre, which is responsible for the design of syllabi and educational materials for primary and secondary schools, has made some headway in the production of textbooks and teachers' guides in the following areas:

- English for primary schools;
- Mathematics for primary schools;
- Science for both primary and secondary schools.

The objective in the teaching and in the production of education materials in English to be used in schools is not only to develop listening, understanding, reading, writing and speaking skills, but also to incorporate, into the teaching and the use of the language, the creation of an awareness of and pride in the children's own cultural heritage and those of others.

In accordance with the objectives, the NCDC is in the process of developing textbooks and teachers' guides for primary schools. At the moment, textbooks and teachers' guides have been produced for standards 1 to 4, and they are already in use in lower primary schools. While they are in the process of producing textbooks and teachers' guides for standards 5-7, these classes are using books and guides produced in Swaziland.

The teaching of English in standard one is supported by a radio programme called the "Radio Language Arts Project", which is broadcast for thirty minutes from Monday to Friday. Pilot schools have been provided with radios and pupils in these schools can follow these programmes with guidance from their teachers. The programme will, hopefully, be expanded to cover all primary schools.

In the case of primary *mathematics*, the objective is two-fold. First, it is to teach the subject in Sesotho in the lower classes (standards 1-4). When the subject was taught in English, pupils had two new concepts to come to grips with, viz: English as a new language and the mathematical concepts as another new field. This tended to block the children's ability to understand and apply the mathematical concepts. Secondly, there was a felt

need to produce materials related to the daily life of the pupils by referring to situations/examples that they encounter daily.

Textbooks and teachers' guides have been produced for all primary level classes (standards 1 to 7). Of these Books 1-2 are now in use in all schools. Books 3-5 are in pilot schools. Books 6-7 are with the publishers. Teachers' guide have been developed for all 7 classes.

Radio programmes to guide teachers in the use of books are being broadcast.

Junior and senior secondary schools use books written by and for Botswana, Lesotho and Swaziland and published by McMillan. The Mathematics panel intends to develop supplementary materials to support this series.

The NCDC is also producing science textbooks and teachers' guides which stress the following objectives:

- ensuring that the medium of instruction in classes 1-3 is Sesotho, while in classes 4-7 the medium of instruction is English;
- ensuring that children develop intellectually by the acquisition of the necessary skills and attitudes that will enable them:
  - a) to make decisions and to solve basic problems occurring in a rapidly changing world;
  - b) to perform simple scientific operations that will enable them to earn a living and become useful members of their society;
- enabling children to understand and appreciate events in their environment and to stimulate the desire to continue to understand the world around them;
- enabling children to appreciate their own culture and respect other people's cultures;
- promoting scientific literacy;
- ensuring a sound foundation in basic scientific principles and facts in those who may later seek to make a career as scientists, science educators or technologists for the betterment of the economy of the country and improvement of living standards.

To date (1988), textbooks for classes 1-3 and teachers' guides based on the requirements of the syllabus as stated

above, feedback from teachers, trial schools and emphasis on practical work and continuous assessment of learners' performance have been written. Pupils' book and teachers' guide for class 4 is in draft form. Books for classes 5-7 have not yet been developed.

The latter half of the 70's saw secondary schools in Lesotho using books developed by the Boleswa countries for the Integrated Science Syllabus. When the Integrated Science Syllabus was replaced, in 1986, by the Comprehensive Five Year Syllabus for Lesotho, the NCDC had to produce new books to meet the requirements of the new syllabus. The new books are mainly activity-oriented and are more or less like workbooks. They were developed with the following objectives in mind:

- developing the scientific skills of observation, estimation, measurement, experimentation, construction, interpretation and analysis of data, inferring, hypothesing, predicting, scientific communication and thinking;
- solving problems scientifically;
- acquiring knowledge and understanding of basic scientific concepts and of the practical application and use of scientific equipment, in preparation for life and further training;
- being aware of the importance of science and technology in the development of Lesotho;
- being equally exposed to practical experiences in physical and biological science.

Pupils' books for all forms and a teachers' guide for all five are now with the publisher and will be ready for use in schools by January, 1989.

Books used in schools for the teaching of *Sesotho* are a product of individual efforts. However, the office of the NCDC responsible for the subject is currently producing a monthly newspaper supplement (*Mahlaseli*) to supplement reading in classes 1-3 of the primary level. It is envisaged that the scope and distribution of the newspaper supplement will be expanded to cover the upper classes.

Some members of the Sesotho Teachers' Association have written a short stories book for use in secondary schools. This book has recently (1988) been published and will be used in schools as from 1989.

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Another group of Sesotho teachers has written a Sesotho grammar book (Sebopeho-Puo) which is used in secondary schools. This book will be used in schools as from 1989.

## **2. The Lesotho Distance Teaching Centre**

While the Lesotho Distance Teaching Centre (LDTC) is not the only non-formal education institution in Lesotho, it is the one dealt with in detail in this chapter because it plays a major role in the production of educational materials in as far as both formal and non-formal education is concerned.

The LDTC was established in 1974, by the International Extension College (IEC), at the request of the Ministry of Education of the Government of Lesotho. IEC is a charitable organization registered in Britain that exists to establish and provide services for organizations using distance teaching methods in developing countries.

As a non-formal education institution, LDTC endeavours to make sure that its objectives and functions live up to the definition of non-formal education, which is:

*"Any deliberate process of communicating ideas and developing skills outside of the established framework of formal school system which will help adults and out-of-school youths increase agricultural production, improve their performance at their work places, attain higher health standards, participate more intelligently and actively in civil, economic and political activities; and to achieve other personal and social goals." <sup>1</sup>*

Another feature of non-formal education programmes is that they are learner-centered.

The mission of the LDTC is to provide education to the disadvantaged people of Lesotho, and in order to fulfill this mission, the Centre has four main activities, which are:

1. It acts as a series agency to other organizations (government and non-government) to supply them with a variety of services that are related to rural development (non-formal education).

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<sup>1</sup>Case & Niehoff: Education Alternative in National Development, 1976.



2. It provides correspondence courses for JC, COSC, and teachers who intend to upgrade their professional qualifications.
3. It produces booklets in Sesotho on practical topics. It also runs village-based workshops to train rural groups and individuals.
4. It produces educational materials, games and workbooks for youths and adults who want to develop their literacy and numeracy skills.

In its role as a service agency, the LDTC provides services like printing of pamphlets, leaflets and booklets, producing radio programmes, pre-testing materials and running communications support courses for field workers of other government and non-government organizations.

In its role as a correspondence institution, the LDTC helps private candidates studying for Junior Certificate (JC) and Cambridge Overseas School Certificate (COSC) by producing correspondence courses and radio programmes. Following are the correspondence courses and the LDTC has produced to date:

For JC:           English  
                       Sesotho  
                       Mathematics  
                       Human and Social Biology  
                       Bookkeeping and Commerce  
                       Development Studies  
                       Geography - not yet complete

for COSC:       English language  
                       Sesotho  
                       Mathematics  
                       Human and Social Biology  
                       Principles of Accounts  
                       Commerce  
                       Geography

Each course consists of a number of workbooks, worksheets and tutor marking memoranda. Except for the Literature, where reference to textbooks is usually expected of

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students, all the courses are self-contained so that the students have no need to refer to textbooks.

These courses are prepared in accordance with the rules for writing for distance education as well as the LDTTC house style. In general, a correspondence lesson

"must in many ways, take the place of a teacher... It guides the student through the material he is to study... It shows the students how to begin his work and guides him/her in using the tools of the trade... The lesson also guides the student on doing practical work... like a good teacher, the lesson needs to offer encouragement... and needs to make the subject interesting and alive..."<sup>1</sup>

Some of these courses - English, Human and Social Biology, Mathematics and Sesotho - are supported by radio programmes broadcast on the national broadcasting service. The number of slots allocated to the LDTTC for its programmes limits the number of subjects that LDTTC can broadcast.

The Lesotho Distance Teaching Centre has also produced printed materials for the Lesotho In-service Education of Teachers (LIET), a programme which is run in collaboration with the National Teacher Training College (NTTC). The programme aims at providing unqualified teachers-headteachers with the necessary qualifications and has two components, the pedagogic content for which NTTC is responsible and the academic content, for which LDTTC is responsible. Following are the subjects for which LDTTC has produced materials:

- Agriculture;
- English;
- Health;
- Home Economics;
- Mathematics;
- Sesotho;
- Social Studies.

These are also in the form of self-sufficient workbooks.

The third role of the LDTTC is to help rural people develop practical skills that they need in their everyday life. In this regard,

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<sup>1</sup>Hilary Perraton - The Techniques of Writing Correspondence Courses, Cambridge, 1972.

the Centre produces booklets in Sesotho (the local language), on practical topics such as cookery, vegetable growing, crochet, cattle diseases. These are produced in response to the needs of the rural people as revealed by surveys undertaken for this purpose.

Work in literacy and numeracy began with a survey to determine the extent of school drop-out problem and to get a clear idea of the levels of literacy and numeracy among adults and young people in Lesotho. This led to the development of educational materials such as learning games and workbooks to help people to gain adequate skills in literacy and numeracy. At the moment, the centre has produced three literacy and numeracy books each. LDTC also produces a newspaper supplement, *Moithuti* (The Learner) which serves to uphold the learning skills of the neo-literates. This newspaper supplement is distributed through two church newspapers.

### 3. Non-Formal Education Institutions

Name of Organization Materials	Type of Training/Educational
Institute of Extra-Mural Services (IEMS) of the National University	Part-time studies in business education; rural development
Women's Groups, e.g.: Lesotho Homemakers's Association, Boiteko Women's Association, Lesotho Women's Institute	Home Management, child care, nutrition, cooking, serving, knitting, handicrafts
Lesotho Planned Parenthood Association (LPPA)	Family planning, diseases
Health Education Unit of the Ministry of Health	Immunisation, disease, public health, child care

These are but a few examples of institutions that play an active role in non-formal education in Lesotho. There are many more, government and non-government, which are omitted from the above list.

## **Conclusion**

It is an element of the education system in Lesotho to review, on a periodic basis, its goals, objectives, achievements and constraints and to formulate future trends on the basis of such reviews. In September 1987, the Ministry of Education held a Seminar, the purpose of which was to:

- take stock of progress, achievements and constraints encountered to date;
- clarify educational policies and streamline priorities to the year 2000, at all levels of education;
- clarify the Ministry's role and responsibilities.

A follow-up seminar was held in June 1988 with the same objectives, but a more diverse composition with regards to participants - all relevant ministries, organisations, churches, community and donor agencies were presented.

The Ministry is now in the process of establishing a machinery for the implementation of the recommendations that came out of these seminars. Many issues were taken up in these recommendations but suffice it to say that the recommendations re-emphasized the present policy and stressed more:

- the need for clarifying the roles of the three partners in the ownership of schools - the government, the churches and the community;
- education at all levels that is relevant to the economic needs of the country;
- education with/for production - the teaching of practical subjects/skills in schools;
- Education geared towards self-employment and self-development.

In the light of these recommendations, all efforts directed at education, whether by the Ministry of Education through its departments and programmes or non-government organisations, whether through schools or non-formal education, will have to be

re-organized/restructured to meet the requirements. It follows then that organizations like the LDTC will have to expand their programmes in terms of staff, funds and facilities and maybe build a new component into their correspondence education to include physical sciences and practical subjects which have hitherto been neglected. Ways will have to be devised to overcome the problems which have, up to now, made it very difficult to teach subjects through distance education.

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## Chapter Four

### **The Editorial Input in the Preparation of Textbooks: The Case of the Primary English Course in Kenya**

*Jonathan KARIARA\**

Editing, or copy preparation as it is sometimes called, is the keystone to publishing and yet it is not easy to describe the actual process, as each text poses unique problems and demands a fresh approach. To this end educational material producers might be interested in sharing with me my experiences in editing an upper primary English language course for Kenyan schools, which is replacing an old course developed soon after independence.

#### **The Safari Course**

The first book in the Safari series was published in 1967. Educational thinking in Kenya at that time required children to speak English from their first day in school, the majority of whom were being introduced to the foreign language for the first time. From the word go, English was to be the medium of instruction in all areas of the school curriculum, except, of course, in the few lessons assigned to the teaching of mother tongue.

Teachers felt unhappy with the New Primary Approach, the euphemism given to the English-medium approach, from the very beginning. Apart from the shock of transplanting their young charges from a one-language situation to another overnight, the new way of teaching called for more resources than the teachers had at their disposal. The method also put undue emphasis on spoken English, and soon, there were complaints that children who were orally highly articulate in English at the end of primary school could hardly write a simple composition, that there was an urgent need, especially in the upper primary level, to re-

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\* Chief Editor, Jomo Kenyatta Foundation, Nairobi, Kenya.

introduce formal grammar to give children a better grasp of the foreign language.

It was also felt that English should be taught as a second language, with local Kenyan languages being used at the lower primary level for instruction in other subjects in appropriate catchment areas.

Although the above reservations were known after the *Safari* course had been in use for several years, the textbooks, the last of which was published in 1972, only started being phased out in 1986, 19 years after the introduction of the course. The last book in the old series will be replaced in 1989, giving a 22 year lifespan to the course.

The point of going into all these details is to demonstrate that the introduction of books for a new course is a long-term investment, the implications of which could provide an important agenda for a discussion of educational materials development and production with the aim of finding ways of mutual cooperation through NEIDA, to ensure that this important tool of education received all the attention it deserves *at the planning stage*.

## **The Primary English Course**

The new course, simply called *Primary English*, first came out in 1986. By then, the enthusiasm of soon-after-independence had considerably faded. The innovations of New Mathematics with their sets and sub-sets were giving way to plain old addition and subtraction; the multiplication table bounced back to us! It needed no less than World Bank funding to bring about the changes that were seen as necessary in the whole school curriculum, and the typescripts for the first year for the *Primary English New Adventures*, perhaps an unconscious, but highly appropriate title, given the way textbooks always seem to be a step behind the latest educational theories! Previous to submission, a panel of thirteen educationists had drafted units to go in all the books in the series, pilot editions had been published and trialled in identified schools, feedback had been received and final decisions taken. As far as the authors were concerned, what they were submitting needed only to be set up in type and inserted covers.

The *Primary English* series is part of a new educational system in Kenya that aims at equipping schoolgoers with both intellectual and practical skills, the latter to prepare them for life

after school. It is an interdisciplinary approach, requiring of the English language course especially that the skills of reading, writing and comprehension learned explicitly during the language lessons will be used implicitly (but directly) in other subjects. The new system, popularly called 8-4-4 (8 years of primary, 4 of secondary and 4 of university education) does not also discriminate between boys and girls - all subjects are compulsory at the primary level, which means both girls and boys learn Home Science and Metal work, to take two former extremes as an example. It was with these considerations that we set about editing the first book in the *Primary English* series.

### **Editorial Involvement at the Jomo Kenyatta Foundation**

The first thing was to read the submitted script for quality and coverage, to ensure that the structural and lexical items identified in the syllabus has been used, and to decide whether this has been done in a creative manner. It was clear from the beginning that we were dealing with a highly competent writing panel, and that the material for Standard 4 was to be respected. The introductory oral work in the Teachers' Guide handled new vocabulary items and grammatical elements in a lively manner, the reading passages used the acquired materials subtly, the exercises in the pupils' books avoided being mechanical and were sound for consolidation. Having satisfied ourselves that pedagogical requirements had been met, the next thing was to sub-edit the material: Can we remove a comma here, insert one there? Is Soila a boy's or girl's name? Please check through for use of names regarding gender, etc.

### **Sub-Editing**

A close reading of the text began to show up curious details. Girls and women were on the average presented as lower performers than boys and men. When we raised the matter with the authors, they said the book was written by men mainly, but on checking the contributors' page, presentation by sex was 50% each! Obviously, then, the authors had not addressed themselves *consciously* to this problem, as required by the syllabus. They promised to rectify matters in the next book.

Then we noticed that there was a slight preoccupation with theft, that in the animal stories, the beasts acted out of malice with the tacit approval of the authors, that a notorious figure from



Kenya's history was shown tricking his brother out of his inheritance. Again, it would seem, without the authors realizing, the negative influence this could have on the readers. I quote from our report:

"The reference to Lenana: he is a dubious historical figure and he fares no better in this account than elsewhere. The authors should check on the tendency in this book to take the attitude that the end justifies the means... We need some morally uplifting stuff and certainly the Lenana bits should either be removed or put into a proper moral context".

They countered by pointing out that the material had been taken out of a history textbook in use in our primary schools. We felt, privately, that two wrongs do not make a right, but they promised to take care of our comments in their next book.

The queries were being raised in an atmosphere of hurry to get the required textbooks for the new syllabus, which had been announced as policy just before the script came to us for publishing. In the circumstances, there was no time for rewriting the text in question, but this feedback from us was going to help the authors to look at the subsequent books with fresh eyes.

## Design

The *Safari* course was devised in the sixties. Prices for raw materials had remained steady up to 1972, and thereafter the cost of paper, especially, had been steadily climbing up. We wanted to price our new course close enough to the published prices of old Safari, to ensure that both parents and government agencies involved in the buying of books could afford the prices. We reviewed the old course with the two aims of improving on the design and at the same time saving costs. We concluded:

- (i) The size of the old course was uneconomical (short lines, shallow depth), making it difficult to fit in the text and the illustrations without leaving too many gaps, which was a waste of paper.
- (ii) The "sans serif" choice of typeface was most unfortunate - almost impossible to read in spite of its large size, again causing a lost of wastage.

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- (iii) The pages were both cramped (hardly any margins) and half empty. They were of uneven length, so that it was almost impossible to decide on when one exercise started and the next finished, making the text difficult to use for both teachers and pupils.
  - (iv) The placing of the illustrations was poor, especially the habit of having an illustration precede the unit heading (See Safari Book 1, page 100), thus mentally linking the picture with the previous unit, and forcing the user to take too many fresh bearings.
  - (v) The illustrations themselves were ambitious (e.g. the effort to create tones of the African skin, the use of colour and tints to create tone and perspective, and the use of full colour), but the result was often muddy.

As a result, it was decided to:

- (i) use Time Roman - the most commonly used format in the print media and therefore the most likely to have been encountered by these upper primary pupils;
- (iii) have a flexible approach to paragraph spacing: generally large enough to encourage easy reading, but with the possibility of reducing it slightly, or increasing it a bit, to fit in artwork and organize the text and exercises into sensible units, with the aim of achieving even page depths throughout;
- (iv) increase the changes of placing illustrations without leaving gaps in the text (we had no time for preparing a mock-up of the text before setting type - we never have!);
- (v) use black plus one colour only, but to change the colour every 16 pages. This would cut down on films and plates, and especially on printing time;
- (vi) commission simple black and white artwork, with overlays for colour, aiming at simplicity, neatness, cheerfulness and low production costs;
- (vii) with (iii) above, the Foundation opted for hot metal composition (we had a printer in mind who had the facility,

and a good old-style type composer), with filming of the camera-ready-copy and litho reproduction of the image.

### **Special Considerations**

The authors wanted some standard cover artwork that we had used on a new Maths course to appear on the English books, and indeed on all their books! It would amaze you how much time was spent in arguing this one out, with the Institute adamant about their stand, and us producing memo after memo to show why we did not favour the idea. I quote from one of the memos:

"I note your wish to use the Maths cover on the English course. The cover is eminently suited for Maths because of its abstract approach, but it strikes me as too rigid for a course on language teaching, which should emphasize freedom (of expression! ) and should appeal directly to the reader..."

In the end, we managed to convince the Institute of the need for individual covers for the books in the series. However, the author's wishes were not completely ignored, as the standard display of the names of the books, and the KIE's logo, name and ladder at the foot of each cover bear witness, which the Institute insisted upon.

### **Conclusion**

By the time we started editing the book for Standard 5, a year later, the first book had sold extremely widely in the country. We had more or less managed to produce it at the price of the books in the old series, but without their shortcomings.

The authors had responded to our criticisms of the Standard 4 book, by assuming a more positive attitude towards women and girls and by generally directing the import of their "argument" towards mutual help. The Standard 5 book was aptly entitled *Neighbours*, but this time, ironically, there were only 2 women contributors among 16 men! Our book appeared in time to be considered independently by a group of 12 women and 3 men researchers who had been working since 1984 into "whether low achievement of girls in Kenya could in any way be linked with images in textbooks". The group was concerned about the non-agricultural images of women in the Agricultural

textbooks, about the sheer absence of women in the texts, about the negative, uninteresting, passive, boring and erroneous images, that a special article was written for F.A.O. Men appear most in the text and pictures of the Agricultural textbooks, boys come next. Girls appear infrequently *and women hardly appear at all*. The absence of grown women figures deprives the girl readers of role models...

To our surprise, History, Languages and Civics were also categorically classified as male domains of learning and endeavour...

Dr. Anna Obura, the author of the article, concludes it by observing that "there is one book just out on market which we see as a breakthrough (in publishing textbooks in which full, diverse, attractive and positive images of women and girls are featured and the images of men and boys expanded to span the full range of human experience) and which we would like to mention by name: the new *Primary 5 English*, a KIE/JKF textbook. "Images are handled with great sensitivity and warmth. A wide range of activities are presented for women and men, boys and girls, all sharing in the development of the nation. We should like to commend this book as a prototype of the future."<sup>1</sup>

## Recommendations

From the above case study, it would be appropriate to consider further discussion on:

- (a) the editorial function in the development, production and dissemination of educational materials;
- (b) the support systems needed to enable editors to exercise their technical skills effectively;
- (c) the qualifications needed to ensure that editors exercise their role in a responsible manner;
- (d) regional cooperation in the production of educational materials.

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<sup>1</sup>"Are Schools Books Educational? Do They Develop the Nation?" article by Dr. Anna Obura, Lecturer in Communications and Technology, Kenyatta University, in *the Kenya Bookseller*, Vol. 1 No. 2, April/June 1988.

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## Chapter Five

# Preparation, Production and Distribution of Books in the Mozambican Education System

*Zeferino MARTINS \**

Books are a very important way of achieving the objectives outlined in an educational programme, especially in recently independent countries, where the building of a new society is a major priority.

In Mozambique, a number of major changes were made in school curricula after independence. These were motivated by the need to move away from the colonial situation where education was intended to perpetuate the domination and exploitation of black people and foster feelings of superiority and leadership in the children of the Portuguese.

The creation of the National System of Education (NSE) recommended by the Frelimo party at its Third Congress in 1977 and approved by the Mozambican parliament in 1981, gave new tasks to the Ministry of Education and to the National Institute for the Development of Education (INDE). This Institute is responsible for the preparation of the syllabuses, pupils' books, teachers' guides and other educational materials.

### **The Preparation of Books in Mozambique**

#### ***Before Independence***

The Portuguese colonial regime had two well-conceived, but very different systems of education in Mozambique. One was for the whites, "coloured" and "assimilados" and the other for blacks.

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\* Curriculum Development Department, Ministry of Education, Maputo, Mozambique.

The former was State-run, academic, based in the cities. It had qualified teachers and there was no link between education and production or theory and practice.

The other system was ruled by the Church and was highly biased towards practical work. It was concentrated in the rural areas and taught by unqualified teachers in the so-called "incomplete" primary schools.

Although the Portuguese regime claimed to be educating the black Mozambican for use as more skilled manpower, statistics show that only 5% of the population was literate at independence in 1975. The school books were developed in Portugal, as were the syllabuses and other educational materials. This meant that there was no experience in the development of educational materials at independence.

### ***Since Independence***

In 1975, a national conference of teachers analyzed the colonial educational system and curricula and with the abolition of the colonial textbooks and programs, all schools began to use "transitional" syllabuses.

The first materials - a Portuguese reader and literacy teacher's guide for the literacy campaign - were produced in 1978.

In 1979-1980, the literacy campaign revised the teacher's guide and published a supplementary book of language exercises and a math textbook and guide, while the Adult Post-Literacy Campaign produced four students' titles and a manual of teaching methods.

In 1977, the Third Congress recommended to the government the introduction of a national system of education which was a synthesis of the education system in the "liberated zones" during the armed struggle. There, education, production and fighting were brought together in an atmosphere of freedom, equality and participation by all. The new national system of education was meant to help create a "new person", a basis for the building of the new society, where there would be no exploitation of one person by another.

In 1978, the National Institute for the Development of Education (INDE) was established and assumed the responsibility for studying the structure and objectives of NSE, taking into account the Mozambican socio-cultural and economic

context. INDE also took on the responsibility for generating educational materials, particularly for General Education.

### ***The Current National System of Education***

In December 1981, the Mozambican Parliament approved the law that created the NSE and its introduction in 1983. The first grade of the system started in 1983, the second in 1984 and so on.

The main objectives of the NSE are: (a) the eradication of illiteracy, (b) the implementation of the universal primary education and (c) the training of qualified manpower for the socio-economic development of the country.

Between 1978 and 1981, Mathematics and Portuguese textbooks and teachers' guides for grade 1, Mathematics and Geography textbooks for grades 5 and 6, a grade 7 History textbook, a grade 9 Biology textbook, the Atlas of Mozambique, a Physical Education manual and four books on racism and apartheid were produced. For the rest, teachers had to rely on the syllabuses as their only resource material.

The decision to introduce the NSE meant that INDE had to stop working on the transitional syllabuses and concentrate, for the first time, on the development of new syllabuses and, consequently, a more organized and unified concept of educational materials.

Between 1983 and 1988, INDE produced 78 titles (including pupils' texts, teachers' guides and atlases). For the first time since independence, students and teachers had a very important means of improving the quality of education.

In accomplishing this task, INDE benefitted from the collaboration of a number of experienced Mozambican primary teachers and some expatriates organized into subject area groups under the direction of Mozambican specialists from INDE, the University of Eduardo Mondlane and the Ministry of Education.

These groups worked together to develop the overall objectives for the primary grades (1 to 7) and for each subject. Panels were organized to discuss each syllabus and to ensure interdisciplinarity. Only after these panels met were syllabuses submitted to the Minister of Education for approval (See Appendix I).

The same teams that prepared syllabuses were charged with the development of educational materials. The advantage of

this procedure is that it ensures a common understanding of the underlying concept, which is very important in a country where important changes in the objectives, content and methodology of teaching have taken place.

### ***Book Production***

Book production is the phase that begins at the moment when the author (or group of authors) submit draft manuscripts to the Publishing Department for editing and ends when the book is ready for distribution. In other words, production includes editing, design, lay-out and printing.

While the preparation phase is done in the Curriculum Development Department, the editing is a task of the Schoolbook Publishing Department, the preparation and production of books were done in Portugal and Mozambique was only a customer.

In fact the development of syllabuses, the writing of books according to the approved syllabuses and the production of books were done in Portugal, in order to ensure uniformity in all the Portuguese colonies: Angola, Mozambique, Guinea Bissau, Cape Verde and Sao Tome.

Only after independence and in order to keep pace with the ever-increasing need for educational materials, was the Schoolbook Publishing Department, created within INDE.

The Swedish International Development Agency (SIDA) is helping Mozambican educational authorities to build its local publishing capacity. Thus, from a very weak starting point, the Schoolbook Publishing Department became the most modern and well-equipped publishing house in the country.

With a staff of about 30 people, it includes an administrative section, editing, design, lay-out, photography, a photo archive, illustration, phototypesetting, and a small printshop (See Appendix II).

SIDA has built and equipped the Publishing Department and provided technical assistance while the Norway International Development Agency has provided paper for textbook production.

#### ***a) Editing***

Generally, the editorial function can be summarized in one word: organization.



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The Editorial Section participates in the discussions of the outline of the original manuscript with the authors, and checks the content and the style of the materials.

When the draft manuscripts are approved by the Minister of Education, the Editorial Section prepares them for printing. It is responsible for bringing the author, layout specialist and illustrator together for discussions of the book's graphic aspects. The Editorial Section plays an essential role as a link between the different functions.

#### *b) Illustration and Design*

This section generally produces illustrations which are assessed jointly by the artists, editors and authors. The illustrations are usually black and white line drawings.

The authors hand in a list of the visuals needed for the textbook in the preparation phase so that the Illustration and Design Section can begin its work early on the process.

Due to shortage of photographic material, the great majority of the visuals are illustrations, which means that this section is usually very busy.

#### *c) Photographs and Photo Archive*

The procedure, when a photo is needed for a book, is to check for one in the Publishing Department Photo Archive where there are now 2000 out of the 20 000 photos planned by 1990, or to give specifications to the Photograph Section so that it can either take a photo or find one from another archive. This section usually waits until there is a significant number of photos requested.

As in the Illustration and Design Section, the author has to send in advance a detailed request for the photos needed.

#### *d) Lay-out and Phototypesetting*

The lay-out section presents sample pages of the book for discussion by the authors and editors. Once a decision is made, the manuscript enters phototypesetting. The whole text is typed on a computer and first printer proofs and then phototypeset proofs are produced for revision. There is a cyclical process of typing and revising until the text has a minimum of errors. The

text is then laid out with illustrations and photographs to produce the final artwork.

### *e) Printing*

The Publishing Department's printshop can do print runs up to 10 000 copies. Normally, booklets, teachers' guides, newsletters, syllabuses and other documents belonging to the Ministry of Education are done there.

This section is equipped with a SOLNER 125 but until now has printed only two-colour materials.

For large print runs, there is an enterprise outside the Ministry of Education (CEGRAF) whose capacity is big enough for thousands of copies to be produced.

The normal procedure is as follows: When the final artwork is ready for printing, it is sent to the National Institute of Books and Records (INDL) under the Ministry of Information, which, depending on the print run, sends it to a particular firm. In the case of pupils' book, CEGRAF does the printing.

### ***Book Distribution***

Within the Ministry of Education, there is an institution called DINAME (Entreprise for Distribution of School Materials) which is responsible for the acquisition of the printed books and their distribution throughout the country. DINAME buys the books from INLD and distributes them to its regional branches in the North, Centre and South. These three branches, in turn, sell them to the private commercial shops where pupils and the public in general can buy the books.

The distribution system has only recently been introduced. A few years ago, the system was slightly different. The books were sent directly by DINAME to the Provincial Directorates of Education; from there to the District Directorates of Education and to the schools themselves. The teachers would sell the books to the students and the money was sent back through the same channel. The Ministry of Education lost millions of Meticals (US \$ 1 = 914mt) using this system.

Since the introduction of NSE, a number of problems in the production of schoolbooks have been detected:

- inadequate distribution system;
- inability to establish and maintain production schedules;

- 
- lack of paper;
  - lack of spare parts for the printing machinery;
  - lack of ink, plates, films, etc.

In addition, all phases of the preparation, production and distribution of books which have been expected to be done in one year are hardly achieved. This includes the on-the-job training of teachers for the use of the new syllabuses and books. All these problems have affected the quality of the books, programmes, examinations and the whole system of education.

It was decided to create a Consultative Board for Schoolbooks whose responsibilities are :

- determining book needs by subject, level and province;
- establishing a production and delivery schedule based upon the needs;
- ensuring an adequate production capacity so that textbooks of satisfactory quality can be produced on time and most economically with a minimum of waste;
- estimating the total and annual capital and recurrent costs of the entire operation and the unit cost per book to ensure adequate funding and annual budgeting;
- seeing that appropriate pre- and in-service training activities are initiated to familiarize educational personnel and teacher candidates with the new materials, including new instructional methods;
- coordination and control of all stages of the three phases of preparation, production and distribution for each individual title to ensure that no bottlenecks occur within the various stages, or through the insufficient supply of spare parts and raw materials.

The person responsible for the Consultative Board for Schoolbooks is the Vice-Minister of Education for Management and its members are: the Director of INDE, the Director of DINAME, the Director of General Education, the Director of Adult Education, the Director of Teacher Education and a representative of the Secretary of State for Technical and Vocational Training.

### ***The Major Problems Encountered***

Few African countries have made a decision similar to that of Mozambique, i.e. introducing a new system of education and abolishing all the books used before independence.

INDE has been writing books for the NSE since 1981 and its main problems in the preparation phase are:

- lack of qualified people who can master the writing of educational materials for the primary level;
- due to lack of time, material is not tested under classroom conditions (except for some books and some specific units);
- outdated equipment for manuscript preparation (the author, who's not a professional, has to type and retype the whole manuscript depending on the number of revisions);
- lack of trained authors (the authors are experienced teachers with no specific training to write books);
- difficulty in ensuring interdisciplinarity between subjects.

To solve some of the problems, the Curriculum Development Department is planning to organize an authors' training program. Due to various needs of such an exercise, this will probably be done in either Portugal or Brazil or in one of the five African Portuguese speaking countries. Regardless of where this training programme takes place, a donor must still be found.

The Ministry of Education is studying two complementary plans for writing books for the secondary level;

- (a) to adopt books in Mathematics and the Natural Sciences from other countries (probably Portugal and/or Brazil);
- (b) to organize "contests" for external writers (basically experienced teachers).

In a recent seminar on curriculum development and evaluation, it was generally concluded that the same team that wrote the syllabuses had to develop instructional materials.

The Editing Section was the last one to be created in the Schoolbook Publishing Department. Although it was extremely

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useful at the beginning because of the attempts to incorporate changes into the system, according to commercial publishers, this section has duplicated functions and becomes a bottle-neck in the whole process.

The authors, who are Ministry of Education employees, did not accept editor's suggestions for changes in the content of the books, since they had already discussed it with a number of scientists, teachers and other professionals.

After a recent seminar attended by both authors and editors, this point was discussed at length and it was agreed that the editor would be an "adult reader" who would not interfere with the contents of the books and would participate from the beginning of the preparation of the books to avoid further disagreements.

One thing that will be a great concern is the role of both the Curriculum Development Department and the Schoolbook Publishing Department in the development of secondary schoolbooks.

Before the introduction of the NSE, schoolbook production was sporadic and so there was always a good stock of paper. When the NSE was introduced in 1983, and with it textbooks of first grade (General Education) and first and second grades (Adult Education), all the stock was used up, and we realized, for the first time, that there was a great need for planning!

But the problems of the production phase are not internal. In fact, the external causes are much important. The first and biggest problem is that Mozambique is a poor country, has no money for imports and is not a paper producer.

All the paper needed for printing schoolbooks is a gift from the Scandinavian countries. NORAD (Norwegian Agency for Development) donates a significative amount of paper every year.

The problems of the production phase are:

- lack of editors to keep pace with the great number of titles that come from the Curriculum Development Department;
- better coordination of preparation and production phase;
- delays in the phototypesetting section, due to the introduction of a computer system;
- difficulties in the colour separation in the four-colour books;

- inability to establish and maintain production schedules;
- limited capacity of the local industry (CEGRAF) due to the ever-increasing need of printruns and reprints;
- insufficient amount of paper to cover the needs of the country;
- spare parts for the printing machinery and other raw materials;
- compatibility between the needs and capacity of maintaining the equipment, printing and reprinting books;
- the main customer (DINAME) of the printing books is facing financial problems and therefore is not paying in time to CEGRAF;
- accumulated delays in the process of preparation and editing that creates bottlenecks in the printing process.

Some activities have been initiated to solve some of the problems identified in the production phase:

- establishment of a programme of training of editors and all the staff of the Publishing Schoolbooks Department (this is being done locally and out of the country);
- establishment of a regular programme of training of personnel for the different activities of book production (this is one in CEGRAF-Graphic and Translation Training Centre);
- rehabilitation of the graphic industry as a part of the national programme of economic recovery;
- initiatives that envisage the increasing need for paper (gift in the traditional paper donors and attraction of new ones).

The problems of the distribution phase are intrinsically linked with the transport and communications capacity of the country and the financial capability of the parents to buy the school material.

The new system of distribution adopted is no doubt better than the previous one, but, due to the programme of economic

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recovery, some changes have taken place in the commercial network, which have created some problems:

- a number of sellers at the provincial level cannot afford to pay for the planned educational materials;
- sellers prefer to sell other goods than educational materials because they want fast turn-over;
- due to the decreasing financial capability, sellers acquire less educational materials and so they choose these that go fastest.

Other problems that have been discussed in a recent meeting of the Ministry of Education, related to the distribution phase, are:

- inefficient communication system from the capital to the provinces;
- an ever-increasing debt of DINAME to the Bank due to a norm whereby DINAME has to pay to the Bank the counter-value of value of all the raw materials gifted by a number of NGO's and governmental agencies like SIDA, NORAD, FININDA and Holland; because of the continuous devaluation of the local currency, the counter-value becomes prohibitive (321 millions meticals in 1987!).

## **Conclusions**

It seems that, in Mozambique, there is a clear idea of the importance of educational materials in the system of education.

The great demand for education has caused changes in the curriculum and the need for the introduction of a new system of education. The right institutions have been created wherever there was a need: INDE for preparation and editing phases, INAME for distribution and the consultative Board for Schoolbooks for coordination.

Out of the Ministry of Education, an establishment for printing has been identified and created and its capacity has been improved. Donors have been invited to help.

A number of procedures and norms have been adopted within the process of preparation, production and distribution of schoolbooks.

What we need is to consolidate what has been already done! More studies have to be done to identify the problems, to propose the solutions, to try out the solution and finally generalize the new practices and ideas.

Next year, the 7th and last grade of the primary level will be introduced. There is need for evaluation of what has been done until now. A careful revision of textbooks has to take place, beginning with studies on the textbook effectiveness and use.

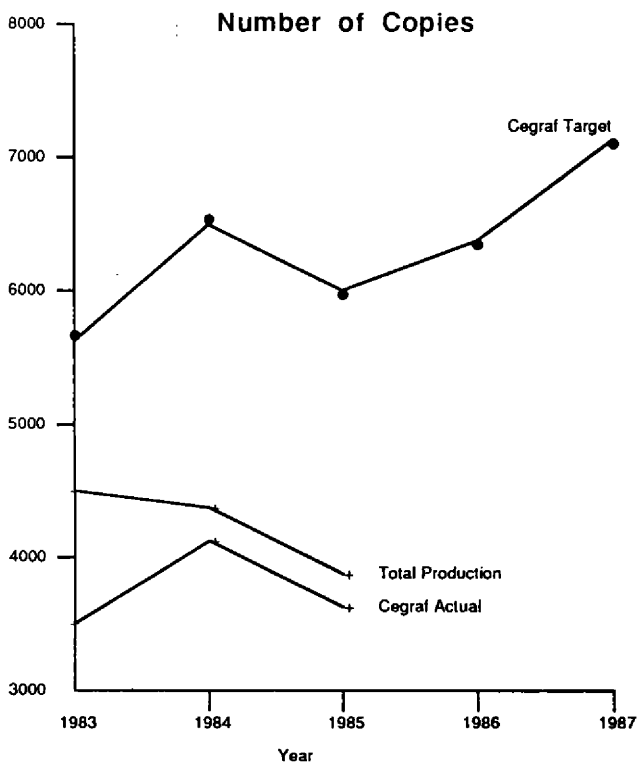
Finally, one would recommend a very strong component of training of cadres for all phases, particularly that of educational materials development and production. Donors usually invest in the production of textbooks and forget the book development phase. The three phases (development, production and distribution) have to be seen as a whole and continuous process.



**Appendix I**

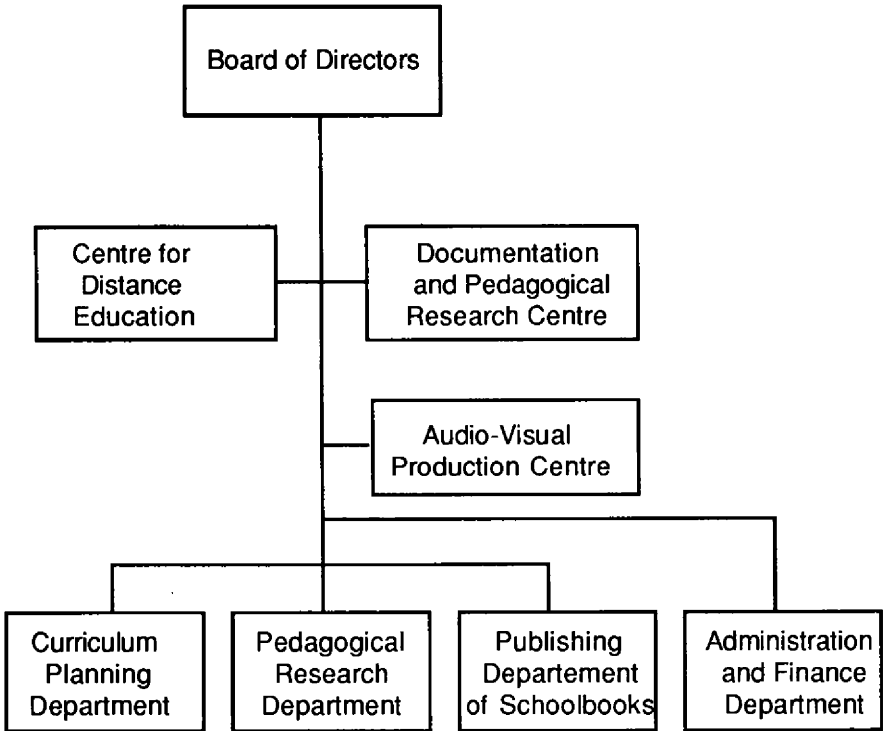
**Schoolbook Production in Mozambique 1983-87  
(Figures in thousands)**

Year	Total Production	Cegraf Production 1983-1987		
	Actual Number of Copies	Cegraf Target	Cegraf Actual	% of TP
1983	4512	5683	3488	77
1984	4413	6580	4107	93
1985	3627	5974	3356	93
1986		6493		
1987		7223		
1988				
1989				



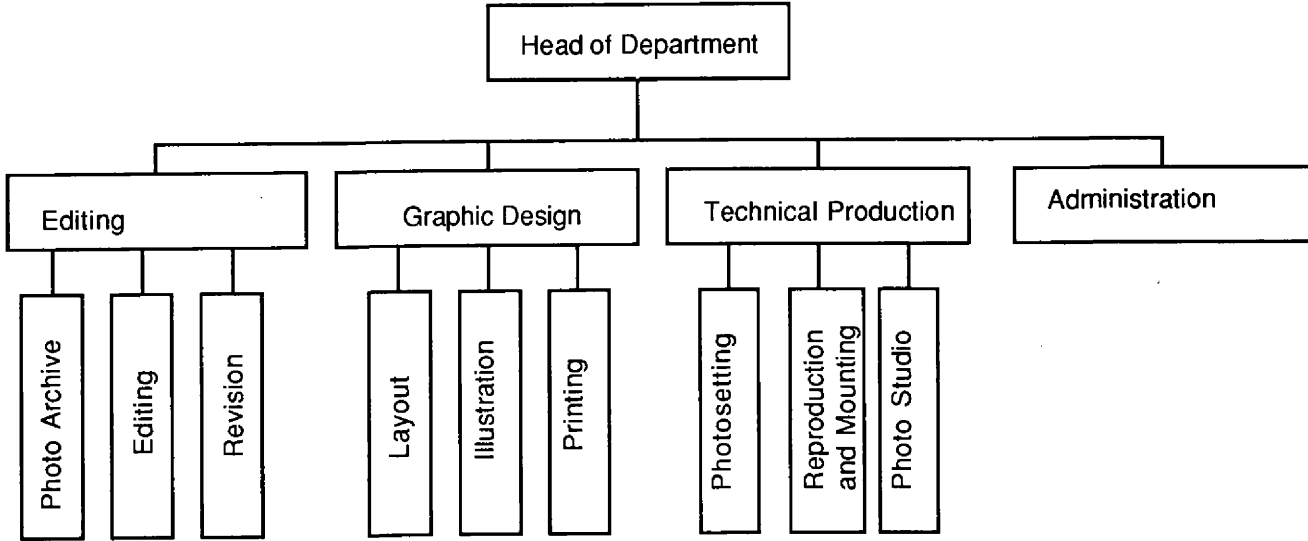
**Appendix II**

**Organisation Chart of the National Institute for Education Development (INDE)**



**Appendix III**

**Organisation Chart for NELE**



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## Chapter Six

# **Mechanisms for the Development, Production and Dissemination of Educational Materials in Mauritius**

*D.J.M. GRENADE \**

Mauritius is an island of volcanic origin situated about 880 kilometres to the East of Madagascar. Sixty kilometres long and thirty-one kilometre wide, it covers approximately an area of 1,860 square kilometres (720 square miles). With a population of nearly one million, it is one of the most densely populated places of the world (Population density: 538:1 sq.km or 1388:1 sq.mile).

Mauritius has a pluricultural society. During French and British occupations, people were brought in from West Africa, especially Gorée Island, Mozambique, Madagascar, India, China and other countries to develop the Island. Today, all their cultures and traditions are alive and strong enough to make of Mauritius a unique microcosm in this part of the world. Many Mauritians can speak five languages, i.e. English, French, Creole (the vernacular) and one of the following Asian languages: Hindi, Urdu, Arabic, Tamil, Telegu, Marathi and modern Chinese. Bhojpuri is the 5th language. All these languages (except the vernacular) form part of the school curriculum and are learned right from Standard I at the age of 5. This is an asset for Mauritians, although the question as to whether it is avisable to teach three languages to very young children is highly debatable.

The education structure in Mauritius is a copy of the British system with 6 years primary, 5 years secondary, 2 years higher secondary - 6 + 5 + 2 system.

Education, although not compulsory, is free from primary to university level, except for the pre-primary where a nominal fee is paid and for private technical or vocational school.

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\* Principal Inspector of Schools, Ministry of Education, Mauritius.

## **National Machinery for Developing, Producing and Distributing Education Materials**

The development, production and distribution of educational materials is the translation of government policy on education into reality and go hand in hand with curriculum reform and development.

The five year plan (1975-1980) and the development plans 1981-1982 and 1984-1986 outlined the following objectives to meet the socio-economic needs of the country:

- (i) to democratize the education system;
- (ii) to distribute schools and colleges evenly over the country to balance the educational facilities between urban and rural areas;
- (iii) to diversify the curricula;
- (iv) to introduce an integrated approach to the concept of education as long life process for the development of a well-balanced personality;
- (v) to adjust the education system to meet the manpower requirements;
- (vi) to adapt the schools to the evolving socio-economic and cultural system of the country;
- (vii) to ensure qualitative and quantitative improvements at all levels and make the system more cost effective.

The above goals were translated into programmes and projects for implementation and an action plan was produced.

As a prelude to reform in primary education, UNICEF and UNDP took care of the pre-primary sector. An ambitious programme started in the early eighties with the creation of a pre-primary unit at the Ministry of Education. A resource centre and regional training centres were set up to look into pre-primary school teacher education and production of materials.

The responsibility for curriculum development and teacher training lies with the Mauritius Institute of Education. In 1983-

1984, a Curriculum Development Centre (CDC) affiliated to the Mauritius Institute of Education was created to meet the needs of the newly launched "Primary Curriculum Development Project" under the aegis of UNDP. Funds were made available for the whole project. A book production unit with modern equipment was set up at the Curriculum Development Centre.

A toy production unit was created by the "Save the Children" (Mauritius). The Unit specialises in the production of educational materials - including furniture, especially for the pre-primary sector. It has its own display and sales centre.

The "Editions de l'Océan Indien" (EOI), a body specialising in the publication (joint venture with CDC) and distribution of educational materials (especially books) sprang up and acted as a link between the Curriculum Development Centre and the consumers. At present, the EOI has three distribution points in the country.

The end of the primary and secondary cycles are sanctioned by examination: the Certificate of Primary Education (CPE) for the primary cycle and School Certificate, G.C.E "O" and "A" levels and the HSC for the secondary cycle.

The body responsible for the award of the CPE and the conduct of all local and foreign examinations is the "Mauritius Examinations Syndicate". It works in close collaboration with the Institute of Education and the Curriculum Development Centre for the production of materials connected with the C.P.E. examinations and for marking of scripts.

Distance education is taken care of by the Mauritius College of the Air. Production of broadcast materials for radio and television is done by members of the Inspectorate, Curriculum Development Centre, Institute of Education and practising teachers in collaboration with the Mauritius College of the Air.

The responsibility for development, production and dissemination of educational materials for the Asian languages lies with the Mahatma Gandhi Institute. Curriculum teams in each of the following languages: Hindi, Urdu, Tamil, Telegu, Arabic, Marathi and modern Chinese work on the production of programmes and books for primary and secondary schools. The Institute has its own printing equipment. Distribution is ensured by EOI.

## **Major Needs in Terms of Educational Materials**

### *The Pre-primary Sector*

In this sector, Government objectives are to promote equality of opportunity, to train teachers and to coordinate activities of non-government organizations and local authorities.

A major development in the sector was the creation of a pre-school trust fund in 1984, to assist, support and promote activities related to pre-school education with the assistance of non-governmental organizations.

In 1985-1986, eleven pilot classes were created by the Government in collaboration with the parent-teacher associations with subsidies from the trust fund. The present trend is to have one pre-primary pilot class in each of our primary schools and we hope to reach 50 classes by the end of 1988.

Apart from the pilot classes in our primary schools, pre-school education is provided by organizations and individuals. This is why it is not free. Children in pilot classes pay a nominal fee of RS 30 monthly while those in private schools pay between RS 250 et RS 300 according to the status of the school, the qualifications of the teacher and the amenities offered. It is estimated that there were some 1400 pre-primary schools in 1985/86 school year. They had about 2.000 teachers with some 1.200 already trained.

All teachers who follow training courses have practical workshops for the production of their own teaching/learning materials. We consider this as essential, in that it gives them scope to use scrap and raw products from the the environment, thus reducing considerably the production cost. Such materials always respond to the needs of child development. Outdoor equipment for physical development is made by local firms and individuals.

The main problems in this sector is the resistance to change of many parents. For them, schooling means that the child should sit still and listen to the teacher. They believe that playing is a loss of time. Regular contacts between parents and school through parent-teacher associations have probed to be of paramount importance to overcome this difficulty.

### *The Primary Sector*

The objectives for this sector were:

- (i) to provide equal opportunities to all pupils entering primary schools by improving the standards of poor schools;
- (ii) to ensure that all children leaving primary schools are at least literate, numerate and able to express themselves clearly;
- (iii) to make educational materials available to all pupils;
- (iv) to revise the curriculum in the light of changing needs of the country and modern trends in education.

It is estimated that a total of 144,697 children attended the primary schools in Mauritius and Rodrigues. This figure represented about 91% of the total population of children in the 5-11 age group. The enrolment ratio is more than 95% as some of the children within that age group attend secondary schools.

Curriculum development is on-going. The major curriculum development project mentioned above was started in 1982. By 1986, the curriculum up to Standard VI was already revised. New syllabuses, instructional materials including textbooks and teacher's guides and new assessment schemes to measure achievement and diagnose learning problems were devised. Unfortunately, the assessment schemes were found to be too time-consuming by teachers and were abandoned.

Six subjects panels comprising of lecturers of the Institute of Education, school inspectors, practising teachers were set up to design the curriculum, produce materials and trial them. These also train teachers and devise assessment schemes in the following fields:

1. Mathematics
2. English
3. French
4. Environmental studies (social studies and science, a new subject)
5. Creative Education
6. Movement Education.



In addition to these, panels were set up for each of the Asian languages as mentioned above. The performance of the different panels was exemplary as they produced a lot of the books required. The breakdown shows the quantity of books produced and distributed to schools through EOI.

1. Work books for standards I, II and III

English	120,000 copies	Partly printed
French	" "	in Singapore
Environmental Studies	" "	
Mathematics	" "	

2. Pupils' textbooks for standards IV, V and VI

English	112,000 copies	Printed by C.D.C
French	90,500 copies	local firms
Maths	112,000 copies	
Environmental Studies	174,000 copies	

3. Teachers' guides for standards I to VI were also produced for:

French  
 Mathematics  
 Environmental Studies  
 Creative Education  
 Movement Education

Teachers' notes for English were included in the pupils' books. Other materials for the primary sector were in the form of elementary science kits prepared for the teaching of environmental studies.

In-service courses, briefing sessions and workshops have been organized for teachers, to help them deal with the new curriculum with confidence and efficiency. In addition, they are trained in the production of teaching/learning support materials. Some have produced excellent work, but a few have found it difficult to design, innovate and produce equipment.

As all these materials have been produced by people who have a wide experience of the classroom or an expertise in curriculum design and dissemination, they are bound to be appropriate and to meet the needs of our children. However, they

have to be evaluated scientifically in view of further improvement and development.

One of the major problems that faced our students was the inability of the low-income families to provide books for their children. Such children find it hard to catch up and normally fail the CPE examinations. To solve this problem, Government decided to launch a free distribution of textbooks to all pupils attending a public primary school at the beginning of 1988. Millions of rupees were injected in this project and it is hoped that the CPE results which had scaled 55% passes during the past years will go up as from now.

### *The Secondary Sector*

The main objectives for secondary education as stated in the Plan for Education (January 1986) were:

- a) to adapt the curriculum so as to suit the needs of a fast changing society;
- b) to upgrade teachers in line with modern developments in the curriculum;
- c) to improve standards in poor schools.

A first curriculum reform project for lower secondary started in 1976. This had to be abandoned for various reasons and all efforts were focussed on the primary project.

A second curriculum renewal project has been operational since January 1986 to review and update the curriculum of the lower secondary forms (I-II-III).

Ten subject panels comprising M.I.E. lecturers, officers of the Ministry and the Private Secondary Schools Authority, practising teachers from State and private secondary schools are actively involved in developing a curriculum that is more consistent with current trends and needs of the country.

Eight State secondary schools out of 23 and 12 private secondary schools out of 102 have been designed to pilot the project. The trial material was prepared, printed and distributed to these schools in January 1987. For social studies, the secondary curriculum writing team met as from September 1986 and started rewriting forms I and II textbooks.

Regular workshops were held for Geography and Sociology teachers. For both subjects, amendments were proposed to existing Cambridge Examination syllabi. In some cases, supplementary materials to help teachers cope with the new aspects of the examination syllabi were worked out.

The revolution in micro-computer technology is profoundly affecting our education system and all national economic activities. Our socio-economic development will depend on availability of people trained in the necessary skills for computer operation. The Ministry of Education, in collaboration with the Institute of Education, has launched a programme of computer education in our secondary schools so as to cope with the situation in the years to come.

Materials for this project were in the form of hardware and software. Some of the hardware units were purchased, some taken on loan from private firms, and some were donated to the Ministry.

Books for upper secondary which should be in line with the Cambridge syllabus requirements have to be imported, although accompanying notes are sometimes prepared locally.

Low-cost science equipment for the lower forms is produced locally and distributed to schools, but precision equipment for delicate scientific experiments as well as chemicals have to be imported.

Tools and equipment for use in crafts room and home economics have to be imported.

The problem in this sector is the incapacity of poor private institutions to have adequate laboratories. As a result, most of them cannot offer science subjects at SC and HSC levels. Consequently, there is a rush towards Government secondary institutions (25 of them for the whole country) and "A" status private secondary schools. This race towards secondary schools starts at primary level, where parents who can afford to pay, give private tuition to their wards. At present, Government is taking steps to control this.

As secondary education is free, Government had to devise a grant-in-aid system for the operation of private secondary schools. One of the most important measures taken was the revision of the formula determining government grant to private schools. The new formula was meant to provide a package of incentives to encourage the improvements of standards in schools. It was implemented in July 1986 and will be fully operational as from January 1989.

Consequent to the change in grant formula, seven schools improved their facilities. Tables 1 and 2 give the changes brought about as recorded in the 1985 and 1986 school years.

**Table 1: Number of schools not attaining the required standard**

<b>AREAS</b>	<b>1985</b>	<b>1986</b>
1. Buildings/classroom areas, recreational and sanitation facilities	18	5
2. Library and reading facilities	31	21
3. Laboratories, specialist room and workshops	42	38
4. Documents at school/school organization	21	1
5. Subjects lay-out, teaching staff/teaching aids	56	13

**Table 2: Facilities offered by private schools**

<b>AREAS</b>	<b>1985</b>	<b>1986</b>
1. Library	31	40
2. Laboratory/specialist rooms	18	22
3. Recreational facilities	10	23
4. Buildings	18	31

### **Technical and Vocational Education and Training**

The objectives of the technical/vocational institutes are:

- a) to provide technical and vocational training in the trades where there is a shortage of manpower for the industrial development of the country;
- b) to equip young people with practical skills;

c) to upgrade the skill of workers in local industries and enterprises and to keep up to date with available technology.

There are at present in Mauritius two Industrial Trade Training Centres (ITTC), one "Lycée polytechnique", 5 Handicraft Training Centres run by Government. There are also many private institutions which run training courses in technical, commercial and secretarial fields.

These centres either run courses during school hours: (a) regular basic training courses for apprentices, (b) further training courses (short term), or after school hours: (a) modular (modules of employable skills) courses for the unemployed, (b) courses tailored to the needs of industry.

The following areas are covered in the ITTC's and the Lycée Polytechnique:

1. Mechanical engineering craft practice
2. Electrical installation and maintenance
3. Auto-mechanics
4. Welding, metal fabrication and sheet metal works
5. Plumbing and pipe fitting
6. Carpentry and joinery + cabinet making
7. Masonry, concrete work and building construction
8. Maintenance fitting
9. Tractor mechanics
10. Production and maintenance mechanics

At the handicraft training centres, short-term courses of 8-15 weeks duration, as shown hereunder, are offered:

- Pattern making;
- Elementary and intermediate dress making;
- Basic hand embroidery;
- Leather work - making and designing of chappals, hand bags, etc;
- Raffia and cane work.

All these centres are fully equipped to provide top quality training of students.

## *Teacher Education*

Pre-service training of teachers leading to the award of a Teacher's Certificate for the primary sector, part-time courses leading to a teacher's diploma for secondary school teachers are run by the M.I.E. (Mauritius Institute of Education).

Also, there are part-time post-graduate certificate in education courses for secondary school teachers: most materials for teacher education are produced and distributed in the form of hand-outs and notes.

Other equipment and materials for practical subjects are either prepared locally or imported.

Courses are run for primary and secondary school teachers and student teachers at the Resource Centre of MIE in the importance and use of audio-visual resources at classroom level. Students undertake practical work and produce wall charts as well as other relevant materials to be used in classrooms.

Micro-teaching facilities of the resource centre are fully utilized by various departments of the M.I.E. Recordings are done in actual classroom situations.

The equipment used for this purpose consists of two video tape recorders (VHS) and 1 video camera for recording and replay. These facilities are also extended (especially during holiday periods) to various organizations which want to improve the communication skills of their members. In 1986, this was particularly the case for courses run for the training of trainers.

The improvement of language skills of student teachers (English and French) is done in the language laboratory of the M.I.E. Resource Centre. Members of the Centre also service a number of courses and carry out school visits. Those who need help with the visual elements (e.g. photos for their dissertations) get it from the centre. Audio-visual resources for all courses are available as and when needed.

From the M.I.E. Report for 1986, we gather that a member of the visual arts section of the M.I.E. started preliminary investigations on "Dyes from natural resources". Around forty different specimens were experimented with and satisfactory results were obtained. The findings have been compiled and sent to all art teachers of the secondary schools for trials.

Three members of the home economics section were involved in the UNESCO pilot project on "Teaching as linked to science education". Modules were prepared on household electrical and mechanical appliances (sewing machines and

irons), their use and scientific basis including simple maintenance and repairs.

There are problems with the organization of in-service courses for teachers in connection with the Primary Curriculum Development Project. Firstly, there is a time constraint. When courses are held during term time, children are left on their own, consequently such courses have to be very limited in duration and teachers often leave them without being fully equipped to deal with new subjects and controversial topics. Secondly, there is a shortage of trained staff to run courses. Members of subject panels at the Curriculum Development Centre (M.I.E. staff and school inspectors) have to tour the regional centres around the Island for such courses and this causes delay in the production of curriculum materials. Training of inspectors in this field is a must.

### *Non-Formal/Adult Education*

This is taken care of by a section of the Ministry of Education, the Institute of Education, the College of the Air, the Extension Services of the Ministry of Agriculture, the Mahatma Gandhi Institute and other organisations concerned with family life and adult education. It is mainly done through radio, TV, broadcasts, short seminars, workshops and information sessions.

The subjects and topics covered concern all spheres of life. This is an area which has to be given serious thought. An adult literacy programme should be prepared and implemented. Ideas from Member States which have an expertise in this field should be shared.

### **The Language Issue**

This is a very delicate problem in Mauritius. The question as to whether it is recommended and advisable to teach three foreign languages to a child of five has been raised and debated on numerous occasions. The main findings are that we should not, but no consensus has ever been arrived at as to what should be done.

The languages of the environment are:

1. Kreol - a main spoken language, although attempts have been made by eminent people to have it in written form and structures. It is spoken and understood by every Mauritian.
2. Bhojpuri - an Indian spoken dialect used by the Indo-Mauritian elements of the population.
3. French, used in families of European descent.
4. English is the servicing vehicle for all subjects of the school curriculum (except French and Asian languages), and more stress has to be laid upon it.

From experience, slightly over 50 % of our school leavers have mastery of English, hence the high rate of failure at the Certificate of Primary Education Examinations (between 45 and 50 %). The main cause of this is the inability of pupils to read and understand the printed message.

It has therefore been found necessary to develop graded readers in this area to increase the reading skills of students.

Seven members of the English Curriculum Panel have been sent to the United Kingdom under a British Assistance Scheme to be trained in the design, development and production of graded English reading materials for primary school pupils.

## **Environmental Science and Agriculture**

As Mauritius is an agricultural country (although agriculture is losing grounds to the benefit of manufacturing industries), rudiments of agricultural science are informally included in the programme of more than 200 schools in the country. It is the Minister's wish that all schools be provided with a school garden.

Garden equipment, fencing, seeds, manure and other materials are provided by parent-teachers associations, voluntary organisations, and the Ministry of Education.

Schools which do not have enough space to create a garden are encouraged to use at least boxes, tins and old tyres for gardening activities. A school garden competition is an annual feature to promote gardening in schools.

## **On-going Efforts to Meet the Current Needs**



Conscious of the importance of educational materials in the teaching/learning process, Mauritius is encouraging its teachers to produce more and more teaching aids. Much help is received from French cooperation in this field.

A toy lending library operating at the Pre-Primary Resource Centre and at regional centres provides toys and educational games to teachers and parents. Teachers are encouraged to adapt, amend or simply reproduce these materials to meet the needs of their pupils.

Private firms and organizations are encouraged to adopt a school each, especially at the pre-primary level, by providing all that is needed as equipment for the school to operate. At least, twenty new centres have been opened through such help during the last two years. In other cases, firms have adopted school libraries by which inputs of book supply are regularly made.

### **An Assessment of the Impact of National Efforts**

In spite of efforts that are being made by Government and the private sector to provide educational materials to schools, it is impossible for each teacher to have a set of ready made equipment. Teachers are therefore urged to supplement the available stock through their own initiatives and efforts. Yet, many are not convinced of the importance of teaching aids and worse still, leave valuable equipment dormant in cupboards.

Teachers who make use of support materials are rewarded by the enthusiasm and progress of their pupils. We have to convince all teachers to produce and use teaching aids.

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## Chapter Seven

# Development, Production and Dissemination of Educational Materials in Nigeria

*E. N. EZEANYA\**

Nigeria has experienced phenomenal increases in the demand for education in the past twenty years. The various governments have responded to these demands in a more or less uniform pattern - massive and rapid increases in the number of educational levels. The increase during a five year period (1975-1980) covering the early years of Universal Primary Education (UPE) in Nigeria is given in the table below.

**Table I**  
**Number of Institutions and Enrolment Figures at Four**  
**Sectors of Education in 1975, 1980 and 1987**

Sector	Number of Schools			Enrolment		
	1975	1980	1987	1975	1980	1987
Primary	21,223	36,524	24,240	6,165,547	13,760,030	11,276,270
Secondary	1,513	2,769	5,962	601,652	1,553,345	2,888,688
Teacher Training (Primary)	250	291		116,222	249,512	
University	7	20	28	32,286	73,425	140,000

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Unfortunately, these quantitative gains have not been matched with equal quantitative development. The result is what has come to be seen as the falling standards of education. Some of the major factors that create the desired level of quality in education include:

- adequate supply and utilization of appropriate educational materials;
- adequate number of qualified and competent teachers;
- motivation of educational personnel;
- adequate infrastructural facilities.

In most cases, these conditions are non-existent. At best, they occur sporadically.

This chapter attempts to examine the current status of the country regarding the development, production and dissemination of educational materials. In doing so, one appreciates the fact that although educational materials are necessary inputs, they are not sufficient to produce desirable outcomes in our efforts to provide quality education. One also perceives the dissemination component of this discourse to imply not just distribution, but also proper utilization. This involves orientation or training of end-users (teachers and learners) in the techniques of usage of new materials. Following the account of our national experiences in this regard, suggestions will be made for the promotion of cooperative efforts in the development, production and dissemination of educational materials at the national, sub-regional and regional levels within the context of Neida.

## **National Machinery for Development, Production and Dissemination of Materials**

### *Government Policy*

Several Government policy documents contain provisions from which a machinery for material development, production and dissemination could be derived.

The National Policy on Education (NPE, 1981) provides for the establishment of teachers' resource centres which will be used for, among other things, "the development and testing of teaching materials". It also makes reference to the establishment

of a "National Book Development Council" (NBDC) whose functions should include promoting the development, production and distribution of books for all levels and the encouragement of indigenous authors".

The report of the Implementation Committee on the NDC (Blueprint, 1979) is even more comprehensive and specific in its provisions. For instance, government accepted its recommendation for the establishment of Educational Resource Centres (ERCs) which should include, among others, "a production unit to produce materials ... which could be turned over to commercial concerns for mass production, and an educational research unit to investigate, design and develop teaching aids". Furthermore, government should "promote the mass production of prototype materials developed by the ERCs".

Based on these provisions, government projected in the Fourth National Development Plan (1981-1985) that by 1985, the country would have attained 100 % local production of tertiary level books. This policy was adopted to make books more relevant to our local needs and conditions, and to reduce the cost of textbooks.

### *Antecedent Machinery*

Before the publication of the three documents cited above, certain specialized agencies had been established by the Federal Government to render such educational services (including materials development) that could not be left to the Ministry of Education. Among the agencies so established, were the Nigerian Educational Research Council (NERC), the Comparative Education Study and Adaptation Centre (CESAC), the National Book Development Council" (NBDC) and the National Educational Technology Centre (NETC). At present, the NERC, CESAC, NBDC and NLF (National Language Centre) have been merged to form the Nigerian Educational Research and Development Council (NERDC). The institutions, operating alongside publishers, teachers' associations and individual teachers tried to provide educational materials for the school system by importation and local production. The educational materials provided by these establishments and agencies can be categorized into four: textbooks and their accompaniments (i.e. teachers' guides and students' workshops); non-text innovative materials with their textual supplementary materials; science

laboratory equipment; and braille texts. A description of the machinery will show how the schools got (or did not get) their supplies of these materials.

### *Textbooks and their Accompaniments*

For a long time, until the late 1970s, textbooks in the country were based on the examination syllabuses of the West African Examination Council (WERC). With the establishment of the NERC and CESAC which started developing teaching syllabuses, the position changed. It was the practice for the WAEC to recommend textbooks for each subject examined. Most of the books were imported. Some schools used to place orders from publishers abroad for their own supplies, but the bulk of the books were imported and sold by the resident representatives of multinational publishers (e. g. Macmillan, Evans, Longmans, University Press, etc.). Government, therefore, did not have much control over what books were used probably because government schools were just very few. With government take-over of over 80% of schools in the early and mid-1970s, it started taking interest in the kinds of books used in schools. Importation did not stop but the various governments selected and recommended textbooks for use in the school system, to a large extent. The teachers' guides were actually the various subject syllabuses and in most times, the textbooks also constituted the students' workbooks.

### *Non-text Innovative Materials*

These are commonly known as audio-visual materials and they are made up of visual materials like charts of different types, three dimensional objects, flash cards, electric boards, photographic slides, transparencies, etc. and audio-materials, e. g. audio cassettes and gramophone records. There are also the video cassette, the film and the synchronized tape-slide system which all combine the audio and visual channels. Until the mid-seventies also it was a luxury to have photographic slides, transparencies, audio and video cassettes, gramophone records, film and synchronized tape-slide systems in schools. On the other hand, charts were available particularly in schools used for teaching practice by student-teachers.

It was generally felt, for all practical purposes, that teaching and learning could go on well without this kind of materials.

Other aspects of non-text materials are the transient broadcast media - radio and television. Educational television and radio were widely used in the Northern and Western States (including the Lagos Federal Territory) schools to supplement the efforts of the teacher and, in some cases, to provide quality instruction in subjects where teachers were deficient (e. g. primary science). These services were provided by the broadcasting organizations in these areas of the country.

### *Science Laboratory Equipment*

As in the case of textbooks at this time, the provision of science laboratory equipment was the concern of individual schools. Also, some institutions (particularly tertiary institutions) imported directly from overseas manufacturers while secondary level institutions purchased from resident representatives of manufacturers. Apart from some glassware produced in some universities for local use, most of the laboratory requirements were imported. Again, because importation was cheap, it was not too difficult for schools to get supplies.

### *Brailled Texts*

Before the policy to integrate handicapped people into the regular school system, no consideration was given to the best way visually impaired people could learn. The few schools in existence were established by missionaries and philanthropic organizations. Audio recordings were used to teach them, but this meant that they could not read. They were trained to write using the typewriter. However, some of these schools imported brailled texts of popular books for use by the students. Of course, the texts were in English.

Supply was therefore inadequate because, in the first place, a large percentage of the blind was left out and even the few in the special schools could only get brailled texts in English.

## **Development Related to the Practical Implementation of the National Policy on Education**

The essence of the NNPE was to make education more relevant to our national needs and aspirations, principal among which was the harnessing of our resources (human and non-human) to achieve self-reliance. This affected the development, production and distribution of educational materials significantly.

### *Textbooks and their Accompaniments*

By the mid-seventies, the two federal agencies, CESAC and NERC, had started activities which led to the development of the first set of teaching syllabuses and teachers' guides for primary and secondary schools as well as teachers' colleges (Grade II). It was on the basis of these materials that textbooks were later written by individual authors, professional organizations, the agencies themselves and publishers. Meanwhile, most schools had been over by their respective governments who became responsible for recommending books to be used in schools under their supervision. The practice then (as now) was for textbook writers, producers and suppliers to advertise their wares at the Ministries of Education. The Ministries of Education select and recommend books to their schools after 'reviewing' them. Of course, the multinational publishers with large capital base and extensive marketing and distribution networks dominated the market. The NERC and CESAC developed their textbooks by using local talents and specialists but went back to these big time publishers for production and distribution while they (NERC and CESAC) relied on royalties to show for their efforts. One of the first bold attempts by a teachers' organization to develop a textbook in the country was that of the Science Teachers' Association of Nigerian (STAN). The Association's Integrated Science series, complete with teachers' book, was very well received at a time when General Science by F. Daniell (a foreign book) was the order of the day; also worthy of note is the 'O' Level Chemistry (by Bajah)) which almost chased Holderness and Lambert out of the Nigerian market.

This practice of individual authors, publishers and government agencies approaching (and in fact lobbying) education ministries for approval of their books was continued to

date. Because it is essentially import-oriented (especially the production aspect), the book trade has virtually collapsed since the economic recession started biting very hard in the early eighties.

### *Non-text Materials*

The potentials of "audio-visual materials" to facilitate learning and teaching was recognized in the mid-seventies and was so stated in the NPE. The Federal Government established the NETC and urged the State governments to establish educational/teachers' resource centres to serve as centres for design, development and production of prototype innovative materials for use in schools. Each State now has an ERC of a sort where some production work is done. The result of a survey conducted by this writer on the production capacity of some of the ERCs indicated that they produced on demand (by schools) and that most of the time the demand level was low. Among the materials produced and displayed at the nine ERCs sampled were: models (of objects, events, distillation, human anatomical systems, etc.), rolliegraphs, colour wheel, meter wheel, flash wheel, abacus, illustrated formula, etc.).

The NETC and the Educational Service of Radio Nigeria specialize in the production of broadcast materials for radio and for both radio and television (NETC). In addition, the NETC produces educational films. At present, the centre co-produces programmes with the Nigerian Television Authority (NTA) and these are broadcast on the national network between 3.00 and 4.00 pm, Monday to Friday. The Radio Nigeria Educational service produces and broadcasts educational programmes for two and a half hours every day, Monday to Friday. It also renders a free tape transcription service to schools, on request.

### *Science Laboratory Equipment*

Importation of these items has continued at all levels of the education system. However, the Federal Government established the Federal Science Equipment Centre, Lagos, in the 1970s and later those at Enugu and Minna a few years ago. The College of Education at Abraka, now a campus of the Bendel State University, has earned a good reputation with its science equipment production unit. There is also the Science



Equipment Production Centre in Jos. Alongside these government funded agencies are some up and coming indigenous manufactures. All these efforts result in the production and delivery, mainly on order, of a vast array of science equipment.

### *Brailled Texts*

By 1980, the NERC had started a Braille Unit to cater for the needs of the visually impaired learners. Apart from transcribing existing texts into brailled texts, the unit also adapts and locally fabricates various charts and equipment in embossed forms for the teaching and learning of science and social science subjects for the blind.

Because of the NPE requirement that the mother tongue or the language of the immediate community should be used as a medium of instruction, the unit started developing braille symbols for some national languages. At present, it has succeeded in creating uniform standardized braille symbols for reading and writing Hausa, Igbo, and Yoruba, as well as for transcribing two Ghanaian languages (Twi and Ga). The unit is also working on the orthographies of three more Nigerian languages (Efik, Edo and Fulfulde).

The WAEC and the National Centre for Educational Measurement have found the services of the unit very crucial for transcribing examination question papers for the blind.

### **Availability and Appropriateness of Materials**

Data are scanty about on the availability of some educational materials, particularly textbooks, non-text materials and brailled texts. The issue of appropriateness requires more empirical investigation which has not been systematically done to any appreciable extent.

#### *Availability of Textbooks*

Most books now used in the primary school level are those written by Nigerian authors or authors resident in Nigeria. At a very recent count, over one thousand of such books were listed. At the secondary school level, 65-75% of texts now used are written by Nigerians (Higo, 1988). At the level of author-publisher

in the book trade, these categories of books can be said to be available. The situation is very different at the tertiary level where the required books (except perhaps Education books) are not produced locally.

A pertinent question is whether the primary and secondary books which are locally produced are available to the end users (teachers and learners). Onugha (1981) investigated the availability of a series of five textbooks developed, produced and distributed free by the NERC under the Universal Primary Education (UPE) Teacher Education Materials Development Project. Ninety-seven teachers' colleges were sampled in the study conducted in 1981 - five years after the books should have reached the schools. His results were most revealing (Table II).

**Table II**

**Availability of UPE Textbooks in Grade II Teachers' Colleges**

N° of Tcs Sampled	When first received by how many TCs				Not yet Received	No Res- ponse
	1976-77	1977-78	1978-79	1979-80		
97	7 (7.2%)	32 (33.0%)	29 (29.9%)	8 (8.2%)	14 (14.4%)	7 (7.2%)

The survey also showed that only 48 colleges (49,5%) had adopted the books for use while 49 (50,5%) had not. Table III shows the number of colleges using the books according to the quantities supplied to them.

**Table III**

**Frequency Distribution of Colleges using the Books According to the Adequacy or Otherwise of the Quantities Supplied**

Number of Colleges	Adequate	Inadequate	No Response
48	7(14.6%)	37(77.1%)	4(8.3%)

The 49 colleges that did not adopt the books had a number of reasons for this as shown below:

**Table IV****Frequency Distribution of Colleges not Using the Books  
According to Reasons for the Non-Use**

Number of colleges	Never heard of the books	Heard of them but have not been supplied	Supplied but not in adequate quantities	Supplied enough but state govt prescribed different books	Other reasons
49	2(4.1%)	12(24.5%)	31(63.3%)	1.(2.0%)	3(6.61%)

Since these books were not available in the open market, the blame for non-supply should rest on the sponsoring agency because it lacked proper distribution machinery.

It has been shown that even the primary and secondary books produced locally are out of reach of users for an entirely different reason - high costs. The tertiary level books are also not available because they are not produced locally and foreign exchange limitations do not allow for importation. High costs have therefore kept essential books out of book stores and libraries (personal and public).

Higo (1988, a) puts the average price increase in his company's books at 143.5% within the last five years and he attributes the rising costs to the following factors:

- scarcity and high cost of paper, film, inks, etc., as a result of high tariffs;
- unskilled and expensive labour;
- very low capital base;
- outmoded printing presses that cannot perform several operations simultaneously;
- frequent power cuts;
- unreliable communication facilities;
- reluctance of existing presses to take on printing of textbooks in preference to calendars, diaries, general stationery, company brochures and annual reports.

### *Availability of Non-text Materials*

Tanko (1985) compared the quantity of instructional media available in six educational institutions (3 teachers colleges and 3 private primary schools) in Zaira with those existing in one school (Miami Elementary School, Lafayette) in the USA. He found that whereas the 6 institutions in Zaira had a total of 30 items, the one school in the U.S.A. had a total of 92 items. The media considered included facilities for projecting photographic slides, films, transparencies and opaque materials. Others were tape recorders, record players, radio sets, television sets, the computer, etc. His findings show that the 6 institutions in Zaira had less than one-third of what one elementary school in the U.S.A. had.

A study conducted by this writer in 1985 on the "Status of Educational Technology in Nigerian Grade Two Teachers' Colleges" showed that non-text but innovative instructional materials were not being used appreciably in colleges. Some of the equipment considered included facilities for projecting photographic slides, films, films strips and transparencies; others were audio-cassette and video-cassette recorders/players. The five-point Liert-type scale was used in analysis and the results were as follows:

**Table V**

**Teachers' Frequency of Use of 5 Common  
Non-Text Instructional Materials**

<b>Respondents</b>	<b>Maximum Score</b>	<b>Average Score</b>	<b>Actual Score</b>
Principals: 66	1650	990	477
Teachers: 303	7575	4545	2090
Students: 333	8325	4995	2420

### *Availability of Science Laboratory Equipment*

Although there now exist a number of science equipment manufacturers around the country, the economic down-turn has caused their production costs to soar so high that schools can no longer afford to procure them.

**Availability of Brailled Texts**

The population of blind pupils/students and teachers or adult workers who benefit from the services of the NERDC Braille Unit has grown steadily since 1980. Depending on the level of the educational system concerned, the growth is between 168% and 955% within the past 8 years (Table VI).

**Table VI**

**Growth Trend of the Population of the Blind  
Served by the NERDC Braille Unit**

Type	1980	1981	1982	1983	1984	1985	1986	1987	1988	Increase over 8 years
Primary	89	100	168	187	311	407	523	799	939	955 %
Post-Prim	120	200	260	279	293	351	431	501	699	482 %
Lecturers/ Adult Workers	17	31	43	47	61	68	92	101	119	600 %
Total	324								2020	

• Source: NERDC Braille Unit

At present, the Unit serves a total of 2020 blind people of all categories and over the years it has been managing to cope with the increasing population of clientele with the same low efficiency Perkins Drailler and Thermoform machines and relatively untrained personnel. The situation will improve tremendously if a modern braille press is established in the country.

## **Emergent Strategies**

So far, it can be concluded that the various types of educational materials are in short supply in schools for various reasons. The efforts by different individuals and groups have not alleviated the problem. However, having identified the problems, new strategies which indicate potentials for a lasting solution are being pursued to make educational materials not only available to schools, but also effective for instructional purposes. These new strategies affect development, production and distribution of all types of materials.

### *Development*

It had been shown earlier that certain tertiary level books are scarce because they are not written in Nigeria and because the cost of importation is unbearable. The NERDC has established a scheme which makes it possible for specialists in some highly technical/professional disciplines (e.g. medicine, engineering, agriculture, accounting, law, etc.) to come together and develop textbooks for the tertiary level in their disciplines. The project has started with engineering and will be extended to other fields of need as soon as the experts get themselves organized. The Council will sponsor the development of the texts. At the primary and secondary levels, the Council has already developed through the same strategy, some texts notable among which are the following primary school series:

- \* Integrated Science
- \* Mathematics
- \* Social Studies
- \* Home Economics

and junior secondary school (JSS) series:

- \* Agriculture
- \* Introductory Technology
- \* Home Economics
- \* Social Studies
- \* Business Studies
- \* Moral Education
- \* French

All series are complete with teacher's guides.

**Table VII**  
**Requirements and Imports of Educational Materials**  
**(in Millions of US Dollars)**

Region	1975		1980		1985		1990		2000	
	Needs	Imports	Needs	Imports	Needs	Imports	Needs	Imports	Needs	Imports
Africa	366.2	245.22	552.8	359.4	669.4	409.4	975	536.2	1,390	625.7
Latin America	758.8	182.7	1,095.0	273.7	1,418.6	354.6	1,735.6	433.8	2,645.7	661,4
Asia	2,383.5	595.8	2,929.9	732.4	3,378.7	844.7	3,793.5	948.4	4,832.9	1,203.2

\* Source: Development of Industrial Scale Manufacturing of Materials and Equipment adapted to Educational needs in the Third World. UNESCO, Paris, 1980, Division of Structures, Content, Methods and Techniques of Education.

In the area of development of non-text materials, for obvious reasons, the emphasis now is on local production using locally available inputs. The strategy here is to draw on the expertise of members of the Network of Educational Services Centres in Nigeria (NЕСSN) for the design and development of prototype instructional materials that will facilitate the achievement of well specified instructional objectives.

In the same vein, the Council has integrated the improvisation and fabrication of common science and mathematics equipment and materials into its National Primary Science and Mathematics Project (NPSMP). Some of the equipment and materials produced (and improvised) during a recent nation-wide training workshop for primary school teachers are listed below:

- |                            |                           |
|----------------------------|---------------------------|
| i. Spring balance          | xi. Optical screen        |
| ii. Electric bell          | xii. Geoboards            |
| iii. Colour disc           | xiii. Protractors         |
| iv. Inclined plane         | xiv. Number stencil       |
| v. Beam balance            | xv. Self-correcting cards |
| vi. Retort stand           | xvi. Abacus               |
| vii. Ray box               | xvii. Fraction board      |
| viii. Periscope            | xviii. Clock face         |
| ix. Concave, convex mirror | xix. Tripod Stand         |
| x. Pulleys                 | xx. Bulb holder           |

The council also published a two-volume production guide (for mathematics and science respectively) to assist those interesting in making these items on their own.

### *Production and Distribution*

The strategy of the Council in this regard is quite simple. For the production of developed texts, it goes into joint publishing agreements with willing and capable publishers. The books are published and marketed for the Council.

The same applies to the production of developed non-text materials. They are turned over to capable companies for mass production. Their distribution, however, will be through the machinery of NЕСSN whose members include all state ERCs and University Institutes of Education.



## **The Nigerian Situation in the Global Perspective**

The literature indicates that the problems experienced in Nigeria in the area of development, production and distribution of educational materials also exist, though to varying degrees, in most Third World countries (and particularly in Africa). Huyn Cao Tri (1976) made projects up to 1980, based on data he gathered on educational materials requirements and imports in most developing countries. These projects have been extrapolated to the year 2000 AD.

The figures in Table VII indicate that Africa imports over 60% of its educational materials requirements, compared to an average of 27% in Latin American countries and 25% in Asian countries.

There is some structural similarity between the emergent trend in Nigeria and the practice in the Czechoslovak Social Republic. There, the education ministries have direct responsibility for the institutions specializing in educational research and materials development. The ministries encourage and supervise commercial firms engaged in hardware and software development. Production and distribution are placed in the hands of commercial firms. This is as far as the similarity goes, for the Czechoslovak industrial sector is so technologically advanced that, in addition to meeting the general demand for the consumer goods it produces, it can also supply enough educational materials and equipment to meet the needs of the schools. Such items as tape recorders, television receivers, record players, and language laboratories; film projectors, 8mm cassette projects and epidiascopes, maps and educational films are locally produced.

The problem of textbook shortages in the Philippines was so disturbing before 1976 that it took the World Bank to provide loans to get a solution underway. Although the solution strategy implemented succeeded in reducing and stabilizing costs (about 2,60 for a 200-page illustrated, paper-bound textbook) in ten years, it was too import-oriented to be recommended. One good point however, is that it was reported that the education sector played its role of overseer very effectively because it retained control over content and tested the books in experimental classes for a year before publication. It also conducted regular evaluations to measure progress achieved with the new books.

Although efforts are being made by individual countries to resolve the problems posed by shortages of educational materials, certain difficulties persist. These difficulties have their root in the socioeconomic and political systems of the countries. However, whatever these conditions are, the difficulties are similar to a large extent, particularly in African countries. Proceedings of the Regional Seminar on Reducing the Cost of School Textbooks in Africa show that the factor enumerated earlier in this paper as militating against local production of textbooks in Nigeria are also present in Benin, Botswana, Burundi, Cameroon, Guinea, Kenya, Madagascar, Mozambique, Niger, Tanzania, Togo and Zaire, to a greater or lesser extent.

There is this tendency towards self-sufficiency among government agencies, publishers and manufacturers within countries in the development, production and distribution of educational materials. This inevitably leads to very high production costs and resultant scarcity in schools, even though there might be a glut at the level of author-publisher.

In free market economies like Nigeria, there is an unnecessary proliferation of books for the same subjects in the same classes, particularly at the primary and secondary levels. For instance, primary mathematics have 6 texts in the series. Assuming there are 10 publishers (Nigeria has much more !) there will be 10 sets of 6 textbooks for the subject - all developed to teach exactly the same concepts in practically the same way. This practice has led to large scale wastage and dissipation of energy.

Another difficulty has to do with the tradition of regarding the public and private sectors as strange bedfellows that must be kept apart by all means. The service sector to which education belongs can never have the capacity to the whole hug of developing, producing and distributing educational materials alone.

## **Conclusions**

This paper has established that the supply of educational materials of all forms falls below demand in Nigeria for several reasons, among which are:

- a) massive increases in the numbers of educational institutions with attendant rise in enrolment figures;

- b) inadequate production and distribution facilities of government agencies charged with the responsibility of developing materials;
- c) sectoral barriers that discourage cooperative ventures between public and private institutions;
- d) a selfish propensity among individual authors, designers, producers and publishers to 'do it alone', leading to a proliferation of like materials (particularly textbooks) with resultant high production costs and hence prohibitive selling prices.

It was shown that although there is almost a glut of primary and secondary level books at the author-publisher stage, these books are scarce in schools for reason of high costs explained elaborately in the paper. Tertiary level books are scarce both at the author-publisher stage and in the institutions for reasons also discussed earlier.

The paper also traced the emergent trend in Nigeria championed by the NERDC in its efforts to address the thorny issue of shortages of appropriate educational materials in schools. The underlying principles of the new NERDC strategies are simply government encouragement through subsidy, and cooperation between the public and private sectors.

The situation in other countries was examined briefly to show that the problems experienced in Nigeria are not peculiar to the country but are indeed replicated in varying degrees, in most African countries.

It is logical, therefore, to seek common solutions to the common problems facing African countries in the very important task of developing, producing and disseminating educational materials.

The new measures being tried out by the NERDC are in the right direction at the national level. However, to ensure that the aims are not thwarted and that the entire Africa region can benefit from its experience, some further measures are suggested below to make it possible for adequate numbers of appropriate educational materials to get to our teachers and learners.

The development of primary and secondary level books should be left solely to a central educational agency at the national level (e. g. NERDC). For the production and distribution of these materials, the central agency should work out a joint

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publishing agreement with capable publishers. The publishers will use their expertise and distribution network to produce and distribute the materials on behalf of the agency or government. For effective distribution to schools, a local network (e.g. NESCN) comprising all ERCs and University Institutes of Education will be very useful.

The scope of the NERDC initiative in providing tertiary level textbooks can be extended to cover the entire Africa region. Under the aegis of NEIDA and/or other funding agencies, African experts in the various fields of study can be assembled to develop textbooks in their respective specialities. In the alternative, countries within zones (e. g. English or French speaking countries in West, East, Central and Southern Africa) could initiate cooperative arrangements among themselves in this direction. The developed materials could then be turned over to reputable publishers through international selective tendering for production and distribution to the various countries. The point of entry in each country should be the central educational agency or the NEIDA National Coordinating Centre. The agency will then use the local network to get the books to the end users.

Current efforts of the NERDC in this area should be replicated in other countries. The Council's strategy here is to determine and analyse specific teaching and learning problems (in given school subjects) through the systems approach, making use of local expertise and talents. Innovative materials are then developed by specialists with the sole objective of eliminating the identified instructional problems. The developed materials are tried out, modified and standardized in the appropriate schools before turning some over to willing industrialists for mass production. Distribution is effected through the machinery of the local network.

Regional cooperation will be necessary to spread this strategy within the region. One way of doing this is through meaningful inter-project study visits.

To ensure availability of these items, efforts should be made in all countries to train and retrain educational personnel to acquire skills for fabrication and improvisation of science equipment so that they can operate alongside large equipment manufacturing centres. For distribution, the local network will again be indispensable.

There is simply no alternative to the brailled text as an instructional material for the blind. There is need to establish a

modern braille press and to train operatives so that the work being done by the NERDC Braille Unit can be boosted for the benefit of the entire region or sub-region.

If fully implemented, the suggestions made above will have the desired effect of ensuring the availability of appropriate educational materials in the right quantities and at reasonable costs to our teachers and pupils/students.

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## Chapter Eight

# **Development, Production and Dissemination of Educational Materials in Zambia**

B. C. SHINGALILI \*

Zambia has made significant progress in the field of education since independence in 1964. Important reforms have been planned, and their implementation initiated, which highlights the priority role accorded to education in the country's development. Between 1964 and the mid-1970s, for example, enrolment in primary, secondary and tertiary education increased by 155 and 336 per cent respectively. Enrolment in primary schools expanded to over 84 per cent of the 6-14 years age group during that period.

Unfortunately, for the past ten years or so, Zambia has gone through a severe economic depression and most of its resources have been directed to other causes, especially debt servicing or to meet emergency situations. This has led to a cut-back in resources going into the social services sector. Education has been as badly affected. There have been severe shortages of educational materials and requisites. This in turn has affected the quality of the entire education system, particularly at the basic level. Not enough attention has gone into the maintenance of existing school facilities either, some of which are now obsolete.

Science and technology are important and necessary tools for the growth and development of any country. Therefore, despite the financial difficulties that have been and are being experienced, Zambia keeps making efforts to improve science education.

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In this chapter, shortcomings in Zambia's performances in the development, production and dissemination of materials for the different stages of our educational system are described.

### **Materials: Availability and Problems**

As stated earlier on, there are acute shortages of science equipment and textbooks in schools in Zambia. Schools experience shortages of essential items such as stationary, duplicating materials, stencils, paper, audio-visual aids and apparatus. This situation is mainly the result of inadequate financial provision for these items in the Government budget for education.

The situation is such that in all cases, pupils are made to share books, one book to about six pupils. Teachers have even gone to the extent of approaching parents officially and privately to ask for such things as stencils, duplicating paper and chalk.

This lack of adequate supply of books and other requisites is worsened by an increase in number of schools and over-enrolment. Most schools in the urban area have over 60 pupils in a class meant for 40. This situation obviously has an adverse effect on the teaching/learning process.

As far as the recently converted basic education schools (Grades 1-9) are concerned, it has been established that they have no Science and Mathematics equipment in stock. The majority of them have no laboratories or are still in the process of constructing or procuring some of these facilities. Government administered secondary schools have some stock of Science and Mathematics equipment. However, most of this is old, and, although some of it can be repaired, it needs replacement because either it is out of date or the cost of repairing might be far in excess of the cost of buying new stock. Grant-aided secondary schools (i. e. schools managed by religious organizations) are generally supplied with good stocks of equipment and most of it is well maintained. However, on the whole, the situation of these schools is only a little better than in Government administered schools. Primary teacher training colleges have science laboratories, but no science equipment. The National In-Service Teachers' Training College (NISTICOL) is no exception in this regard. As regards Teachers' Training Colleges, their equipment is worse than that found in typical Government schools.

In general, all schools and colleges have laboratory space for most of the Science subjects that they offer, but the problem is that most of these facilities are in a state of disrepair. Most of them do not even have basic furniture. Unless the conditions of these laboratories are improved, provisions of equipment alone will not lead to an improvement of Science and Mathematics teaching.

The unsatisfactory situation created by inadequate supply of teachers and the lack of teaching equipment in most of the schools and tertiary institutions result in unsatisfactory teaching in the schools and teacher training institutions. This must be a major explanation for the apparent lack of interest on the part of students to follow Science and Mathematics courses, or for the inability of most of them to perform adequately in studies at higher levels.

At the Curriculum Development Centre (CDC), there is a good Visual Aids Section intended to cater for all technical colleges. The lecturers from all institutions are free to come and make any visual aid they may wish. Sadly, this expensive equipment is just gathering dust. There is no lecturer who has gone there to make a visual aid, not even those from institutions within Lusaka. In actual fact, most of the lecturers do not even know the existence of such a facility. There is therefore a great need for advertising its existence. It was a relief to learn that arrangements are being made to invite lecturers to the CDC to come and see what is available.

On the other hand, one would understand that it is rather difficult for some lecturers to travel 300-400 kilometers to come and make any visual aid. Consideration should be given, in this regard, to decentralization of the facility, at least to provincial headquarters towns.

### **Current Efforts and Initiatives to Remedy Some of the Deficiencies**

Significant initiatives have been taken by the Zambia Government with the assistance of donor agencies to solve some of the problems within the education system. The list below includes as well the efforts made by teacher organizations and communities:



- (i) The creation, soon after independence, of the Kenneth Kaunda Foundation with its subsidiary companies - e. g. National Education Company of Zambia (NECZAM) in charge of printing educational materials, National Education Distributing Company of Zambia (NEDCOZ) which markets and distributes textbooks and other supplies to schools. Due to the financial constraints already stated earlier, the Foundation cannot operate at full capacity. Therefore, the production of books is erratic and cannot meet the demands of schools.
- (ii) Swedish International Development Agency (SIDA) has a project for the production of copy books, and this is planned to continue until 1989. This is mainly for English and Zambian languages. It is also providing raw materials for printing education materials and is undertaking a study of the whole issue of textbooks production and supply in Zambia.
- (iii) Zambia Educational Materials Project (ZEMP). FINNIDA has a textbooks rehabilitation and development programme (ZEMP). One aspect of it is to provide to the Curriculum Development Centre, facilities for the production of textbooks and other materials for Grades 8 - 12. The first texts under preparation are for the Mathematics, Science and English. A second aspect of this project is the assistance being given to the development of the capacity of NECZAM to process and produce draft materials from the Curriculum Development Centre more expeditiously.
- (iv) Zambia Mathematics and Science Teachers Education Project (ZAMSTEP). This is an European Economic Community funded project related to Science and Mathematics teaching and curriculum development administered by the British Council. Two specialists (one Science and one Mathematics) are based at the Curriculum Development Centre and proposals have been submitted for an expansion of the project. This expansion will provide expertise, to be based in secondary teacher training colleges, for work in both the pre-service and in-service training of Science and Mathematics teachers. The experts would also act as resource persons in the regions in which they would be stationed.

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The objectives of the project are as follows:

- (i) to upgrade Mathematics and Science teachers at junior secondary schools. In 1984, only 50 out of the total of 551 teachers of Science and Mathematics were Zambian graduates, 362 (66%) were Zambians holding non-degree teaching credentials and 139 were expatriates.
- (ii) to provide advice to primary school Science teachers;
- (iii) to encourage the production of primary Science and Mathematics educational materials;
- (iv) to provide advice to secondary schools teachers.

### **Resource Teachers**

The Government policy, which is not met, is that each primary school should have a resource teacher. A number of schools will form a zone and there will be a number of zones within a district. There will be provincial resource teachers before finally having a national committee. This is done mainly through what are called "Chongololo Clubs" and organizations as Self-Help Action Plan for Education (SHAPE). The SHAPE project is supported by FINNIDA, CIDE and NORAD. It undertakes regional educational activities through resource centres, school based teachers centres, production units and practical subjects units based at the Curriculum Development Centre.

Each primary school has what is called a parent-teachers association (PTA). The main objectives of these PTAs is to organize Production Units and raise money for infrastructures. Because of what the associations see in their children's schools, they now even get educational materials for the pupils.

### **Upgrading of Science Teaching and Local Production of Science Equipment**

This project was signed between the Government and the United Nations Development Programme (UNDP) as the Basic Standard Technical Cooperation Agreement. This is the biggest project by Zambia for the production of Science equipment and it is being executed by UNESCO.

Immediate objectives are to:

1. Establish within the Curriculum Development Centre in Lusaka a national science and mathematics equipment production unit. The unit should be capable of designing and developing equipment prototypes; conducting courses on the production of low-cost teaching equipment and for laboratory personnel; guiding the work of regional production units and managing and coordinating a national system for purchasing and distributing raw materials. It will also undertake the producing, distributing, servicing and evaluating of teaching equipment;

2. Establish nine regional units for the production of science and mathematics teaching equipment. These units should also be capable of producing low-cost teaching equipment based on the prototypes developed by the central production unit; conducting production of the equipment and materials;

3. Establish at each of the nine regional production units a mobile workshop capable of providing maintenance and repair services for the equipment distributed to school;

4. Plan and initiate a permanent programme of in-service courses for teachers of science and mathematics in basic education and secondary schools, particularly those teaching at Grade 8 and 9 levels;

5. Strengthen the existing framework for involving teachers of science and mathematics in the work of the Curriculum Development Centre. In particular, the project will give support to national and regional activities of the Zambia Association for Science Education (ZASE) and the Zambia Association of Mathematics Education (ZAME), especially those activities which are intended to provide professional cooperation amongst the various interest groups involved in science and mathematics education in Zambia - teachers, curriculum development specialists, inspectors of schools, lecturers in teacher training colleges and specialists from the University of Zambia.

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## Chapter Nine

### **Community and Individual Initiatives in the Production of Educational Materials in Sierra Leone**

**Staneala M. BECKLEY\***

The educational programme provided in Sierra Leone is designed to cater for the child's interests, ability and aptitude, taking into account the manpower training and skills required for the country's development. The formation of positive attitudes and traits of character are also an integral part of the educational programme. Much emphasis is laid on the importance of manual skills and the relationships between the type of education provided and the local environment. The notion of "indigenisation" is therefore one that is considered of vital importance in the curriculum at all levels.

Against this background, a number of specific objectives have been outlined. These include:

- expansion of primary education facilities, ultimately leading to universal primary education;
- diversification of secondary education with orientation towards technical and vocational training;
- specialized training in agriculture and related activities to rural youths;
- an expanded teacher-training programme.

University education is provided for further personal development and is geared towards the supply of third-level manpower to meet the country's development needs. Increasing attention is given to the search for pertinent solutions to local

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problems through the conduct of applied and policy-oriented research. The College of Medical and Allied Health Services is a recent addition to the country's educational institutions and whose establishment is consistent with health education policies for the training of levels of manpower required to solve the country's health needs, and in particular, those of the rural areas.

In recognition of the high rate of illiteracy in the country, recorded as 86% for women and 74% for men, the educational system accommodates programmes in adult literacy and adult education, channelled through the Adult Education Unit of the Ministry of Education. Collaborative efforts are made with non-governmental agencies concerned with adult education, as well as with the Institute of Adult Education and Extra-mural Studies at Fourah Bay College.

It has long been realized that the formal education system does not provide sufficient answers to the problems confronting the rural populace. Consequently, efforts are currently being directed at the integration of rural education in the educational system. The 'Bunumbu Experience', a rural education project, is now being consolidated and disseminated to other areas of the country.

Compared to other sectors of the economy, education receives a huge slice of the national budget. Next to agriculture, it is the largest item of government spending. Yet, the illiteracy rate in Sierra Leone is still one of the highest in Africa.

In recent years, education in Sierra Leone has suffered severe blows as a result of inadequate financing. In budgetary allocations to this sector, recurrent expenditures have far outweighed development expenditures, with teachers' salaries, consuming some 85% of the Ministry's budget. There has been a noticeable decline in the delivery system, due largely to prevailing economic austerity conditions. Results of recent studies on the state-of-the-art in education in Sierra Leone showed marked deterioration in physical conditions, acute scarcity of textbooks and other educational materials, and gross inadequacy of physical facilities. The increase in enrolment rates, especially at the primary level, has further aggravated the situation.

The teaching profession itself is not a popular choice among young graduates. Despite recent increases in salaries, teachers' standard of living has scarcely improved. Frequent delays in salary payments (sometimes up to 4 months) as well as

discouraging school and classroom conditions have caused a marked slump in morale. Movement away from the profession is common. Evidence suggests that a good number of teachers who do remain in it have found alternative means of wage earning, some of which are incompatible with their normal school routine. These prevailing conditions partly explain the sluggish progress of innovative programmes outside pilot project schools as they tend to make new demands on teachers.

### **Provision of Educational Materials**

In terms of the provision of educational materials, government spending has been far less than the actual demand. This has had far-reaching consequences among which is the extreme shortage of materials for use by pupils and teachers at all levels of the educational system. The unfavorable economic climate has imposed severe constraints on the purchasing of these materials from overseas sources. On the contrary, countries such as Ethiopia, Lesotho, Nigeria and Mozambique have institutionalized machineries for the preparation and production of educational materials, especially at the primary and secondary levels, so that importation is virtually non-existent.

Normally, primary school books and other written materials in Sierra Leone are prescribed by the Ministry of Education on the recommendation of a textbook committee set up by the Ministry. Books for use at the secondary level are recommended by subject teachers. At the higher levels the choice of book is based on the G.C.E. 'O' and 'A' level examination requirements. At the tertiary level, books are prescribed by tutors and lecturers. In general, the supply of non-text teaching materials and media by the Ministry of Education is considerably inadequate, so that instructors have had no alternative but to do without them or to improvise by making use of locally available materials, where possible. In a few schools, materials such as chalk and blackboard rulers are bought by teachers from their own resources or out of PTA funds. In many cases, blackboard dusters are locally made by teachers and pupils.

Often, foreign institutions such as the British Council and the French Embassy donate books and other teaching materials and equipment to schools and colleges. Books donated are normally for reference purposes only, and are not often utilized by the large number of students for whom they were provided. In

fact, such books have been known to remain on some instructor's personal bookshelves. Equipment have often degenerated into items of furniture through lack of maintenance, power failure or unavailability of spare parts. Many bookshops around the country now stock items other than books. Where books are available, they are in short supply and prices are prohibitive for many parents. The Fourah Bay College Bookshop of the University of Sierra Leone which for years was the main source of educational materials for both secondary and university students, was hut down three years ago due to management problems. Second-hand bookstalls have sprung up all over the country and are better patronized than established bookshops. Items for sale include used crayon and coloured pencil sets, geometry sets and used books. The latter were formerly repaired and re-bound before being put on sale. However, this practice has recently stopped, and prices have increased. The majority of pupils, particularly those from homes where parents are not literate, go to school without books. Others depend on sharing with their colleagues.

There is a government printing press and several privately-owned printing and publishing enterprises. Generally, printing is undertaken on a modest scale and is limited to non-formal materials such as newspapers, newsletters, printed materials for office and administrative purposes, and items for social and religious functions. Clearly, these facilities do not suffice to meet the great demand for the variety of written materials in both formal and non-formal education.

Shortly after the founding of Bunumbu College by missionaries in 1933, facilities for printing were provided with the aim of producing materials for adult literacy in Mende, Themne and Limba. These materials were used in programmes for the training of catechists.

The Bunumbu Press as it was known, was later transferred to Bo and is now in joint operation with the Provincial Literature Bureau. Local printing facilities for educational materials in the formal sector are virtually non-existent. The Government printing office turns out small quantities of exercise books, but the numbers are hardly sufficient to satisfy the demand. In many cases, local entrepreneurs have saved the situation by arranging their importation from neighbouring African countries. The University of Sierra Leone in 1987 made proposals pertaining to the establishment of a university printing press. When set up, it is

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expected that the press will be in a position to produce and publish books, journals, magazines, occasional reports, pamphlets, school textbooks and exercise books for Sierra Leonean school children. Printing possibilities already exist at Fourah Bay College and Njala University College libraries and at the Institute of Education. The facilities available cannot however meet the exigencies of materials production in the absence of more appropriate equipment.

### **Overview of Initiatives in the Development of Educational Materials**

There is a consciousness in Sierra Leone of the need for appropriate educational materials, where new curricula, perspectives and methodologies are proposed. Formerly, most of these materials were imported. Attempts to locally develop and produce them were motivated not only by the innovative changes in the curriculum, but also by constraints in the procurement of foreign exchange to purchase from external sources and also the need for culturally relevant materials for use in indigenous language education and rural education.

Local initiatives are evident at three main levels:

- i. at the level of government/international agencies;
- ii. at the indigenous group level;
- iii. at the individual level.

The state-of-the-art in materials development, production and dissemination in Sierra Leone is a complex one. Motives vary, ranging from genuine concern over the acute shortage and high cost of materials, to career development and personal profit. These are cases of secondary motivation, such as the need to develop support materials where the central pursuit is remedial teaching. Many syndicates fall into this category.

Consideration has been given to all levels of education in materials development, including both the formal and non-formal education sectors. A clear pattern has emerged in the areas of interest embraced by initiators. For example, the efforts of government and academic institutions seem geared towards developing materials for use in formal education and at the primary and teacher-training levels, in particular. In the same vein, the interests of many NGO's, local as well as international,



lie mainly in developing materials for non-formal education, particularly in functional literacy programmes for adults. Individual initiatives vary, according to their vocation. Teaching personnel tend to produce handouts and guides for students in schools and colleges. Individuals oriented towards social and voluntary work tend to engage in developing materials in adult education.

In general, the type of materials that have been developed by all categories of initiators are limited to written materials.

Materials development, production and dissemination in government-initiated projects is normally undertaken with sponsorship from external sources. Joint ventures between government and academic institutions on the one hand and international agencies such as UNESCO, UNFPA, the British Council and the German Adult Education Association (DVV) on the other, gained momentum in the 1970's. Written materials produced are in the form of syllabi, teachers' guides, pupils activity books and supplementary readers. There have been two major projects in local textbook production; at the primary level, the Sierra Leone/World Bank/ODA Third Education Project in English, Mathematics, Science and Social Studies (temporarily suspended); at the secondary level, the National Programme in Social Studies, a Sierra Leone Government Project implemented in collaboration with UNESCO and UNFPA (1973-1984).

Other types of materials include charts, flashcards and similar teaching aids. These are produced on a small scale in pre- and in-service teacher-training programmes, in adult literacy and by dedicated primary school teachers. Non-text materials are the major concern of the Schools Broadcasting Unit of the Ministry of Education. A small transmission service exists within this unit. But these media are hardly utilized by the schools, for a number of reasons among which are: unsuitable programme schedules, lack of equipment and power failure.

The involvement of groups and individuals in the local community in materials development is relatively recent in Sierra Leone, unlike other African countries like Nigeria and Kenya, where efforts at developing, producing and disseminating these materials are fairly advanced. Attempts by this category of initiators in Sierra Leone are still at an elementary stage. A distinction is made between individuals with some form of foreign input and support and whose materials are utilized both locally

and internationally, and those working at a very basic level and whose products are almost entirely for local consumption only. Even here, it should be noted that the scope of local consumption varies. More resourceful and enterprising individuals produce for a larger group of consumers, while others with inadequate means and resources produce materials for a restricted group of consumers. The same could be said of initiators who have come together to form local syndicates. Larger syndicates such as Cardinal Educational Enterprises and Manskay Correspondence Institute cater for a wider public while smaller groups of teachers in the community cater only for the small number of students registered in their groups. In all of these local community initiatives, the focus is on the production of pupil's guides and notes, based on existing curricula. This being the case, the conclusion that can be reached is that these initiatives are strongly inspired by the presence of examinations. Such an orientation clearly reflects the overall attitude of the community towards the learning process and educational objectives. The desire to succeed in examinations is such that learning for its own sake is almost meaningless.

Local community initiatives in the technical areas of production of educational materials are at a very basic level, and not much is being done in this area, unlike the situation in Nigeria where the private sector is very active in the production and publication of materials.

## **Description/Assessment of Locally Developed Materials**

### ***Profile of Local Expertise***

In spite of the massive brain-drain afflicting the country, human resources are available for the development of educational materials. Projects in materials development undertaken by government in cooperation with international funding agencies are normally executed by the Curriculum Development Unit of the Institute of Education (now the National Curriculum Development Centre). Here trained subject specialists collaborate with their counterparts at the teacher-training colleges and the university in the preparation of written materials. Adult education project teams comprise staff of the Department of Adult Education and Extra-Mural Studies of

Fourah Bay College (INSTADEx) and the Adult Education Unit of the Ministry of Education. Inter-disciplinary teams are frequently set up for multi-faceted projects such as the UNESCO-sponsored training programme in primary education and adult literacy which produced a manual for trainers in Krio.

To enhance project work for schools and colleges, experienced teachers, head teachers, inspectors and supervisors are often invited to participate in writers' workshops. This has the added benefit of developing the writing skills of such personnel. Considerable potential exists for a high level of performance, as has been demonstrated in these workshops. Sometimes, specialized training is provided for local project staff. In the National Programme in Social Studies, two lecturers at Njala University College were trained in Population Education by the project. Similarly, in the Third IDA Textbook Project, a team member received training in editing and publishing skills at an overseas institution.

International NGO's such as CUSO, the D.V.V. and the Peace Corps, also work in cooperation with local specialists in the preparation and production of adult literacy texts. Where foreign expertise is employed, it is usually at the initial and final stages of the projects that such personnel act in an advisory capacity. The value of local input is increasingly being recognized although contribution is still most prominent at the writing stage of materials development. Editors, graphic artists, illustrators, designers and publishers are often recruited externally for the final printing and publication of materials. Much more needs to be done to train more local personnel to execute these functions, especially at a time when local funds cannot meet the cost of these services provided by foreign establishments.

Materials development in educational syndicates is undertaken by local authors with no sponsorship or guidance from external sources. The managing director of Cardinal Enterprises, a remedial teaching concern, has twenty years of classroom teaching experience and twenty-five years so far of university teaching experience, which makes him well placed to offer valuable advice on content and methodology in materials preparation. Authors in Cardinal Enterprises comprise lecturers at the University of Sierra Leone and secondary school subject specialists. Editing, production and dissemination are done by Cardinal employees.

Manskay Enterprises, a local correspondence 'Institute' recruits its writers and editors from a pool of secondary school teachers and principals. Student guides and handbooks are produced for external examinations in a wide range of subjects, including English, Commercial Arithmetic and Book-keeping. It also encourages teachers to produce their own materials by availing themselves of its editing and printing facilities, although these are very modest in both quality and quantity. In spite of this, Manskay Enterprises has been extending its services outside Sierra Leone and now provides services for students in the Gambia.

Several initiatives have been taken by indigenous authors, on an individual basis, to develop written educational materials. Reputable and internationally recognized authors include Talabi Aisie Lucan (Social Studies), C. Magbailey Fyle and Arthus Abraham (History and Culture), C. N. Fyle and E. Jones (Language Studies) and Pamela Greene (Home Economics). There is a small number of literacy authors. In all of these initiatives, facilities for editing, printing and publication were arranged through external intervention. It should be noted that in almost all these cases, the materials produced are not for local consumption only, but are in demand in other countries.

Indigenous efforts at all stages of production are evident in the plethora of materials designed for local consumption only.

Some of these entrepreneurs utilize the services of the more established printing presses. Where funds do not permit, budding printers often come to rescue of these willing but indigent authors. In this category, are typical 'grassroots' enterprises geared to meet the immediate needs of specific groups of consumers. From this profile, it is evident that some attempt (albeit slight at the moment) is being made to collaborate local expertise by pooling of resources.

### **Quality of Locally Developed Materials**

There is marked variation in the quality of these materials, in content, presentation and general appearance. Quality is largely affected by the authors' professional qualifications and level of competence, the scope of the venture and level of funding.

In government-initiated projects, where preparation and production of materials are externally financed, such materials are generally found relevant and suited to the felt needs of their beneficiaries. It is not in all cases that provision is made for materials to be trial-tested in pilot schools prior to large-scale distribution and dissemination, as the immediate concern is to provide schools with textbooks as urgently as possible, without having to undertake the usual operation of establishing pilot schools.

In terms of format and durability, much remains to be done in the case of locally prepared materials. Even where external funding is made available, syllabi, teachers' guides and pupils workbooks are often cyclostyled and unbound, considerably reducing their durability. This may be due to the fact that some projects in which materials are prepared have still not attained their final stage. For others, funding was suspended or terminated, causing the materials to remain in draft form.

The quality of materials prepared on the initiative of individuals and local community groups also varies. In terms of content, it should be pointed out that ideas are not always original and may be wholly reproduced, plagiarized or adapted from published sources. Some authors pay little heed to copy right infringements as in the case of 'West African Verse: An Anthology of Longer Poems' reproduced by Manskay Enterprises under the 'Appropriate Learning Materials' Series, for a local entrepreneur. Copyright constraints are circumvented in some cases by slightly modifying or adapting original texts. The Franco-Sierra Leonean Pedagogical Center's adaptation of 'New France-Afrique' is one such example. Credit should be given to individuals and groups that have produced original materials. Examples of this are texts prepared for economics, geography and history by Cardinal Enterprises, and Samgba's 'Exercices d'Exploitation'. Hardly any original texts are officially assessed prior to gaining access into educational institutions. Informal discussions however reveal that such materials are

usually well-received by instructors and students as they fulfil an obvious and pressing need. Their authenticity is justified on the grounds that they were prepared by recognized subject specialists in the community. Overall, the courageous steps taken by local entrepreneurs to provide educational materials at low cost need to be commended, as it is obvious that the State lacks the necessary machinery to cater to the needs of its educational institutions. Through the experience gained in these initiatives, government will be better placed to formulate appropriate policies on local production of educational materials, as well as learn from the experiences acquired by local entrepreneurs in the community.

### ***Availability, Distribution and Dissemination of Locally Produced Educational Materials***

In government-initiated projects, materials prepared are made available to pilot schools only. Large-scale distribution is done at the dissemination stage, but only to government-assisted schools, as funds do not normally permit distribution to other categories of schools. Even so, access to materials is often hampered by two major factors:

- i. inadequacies in the storage and distribution systems;
- ii. discontinuity of production.

With respect to i) the problems lie in delays in the transportation of materials from the central warehouse to district stores. The IDA Textbooks Project suffered from incidents of theft at the central warehouse in Freetown, which disrupted the distribution exercise for nearly a term. On arrival at the district stores, consignments for schools were to be collected by head teachers from district education officers. This posed severe hardships for schools in isolated areas, far-removed from district stores or inaccessible by road. In terms of ii), it is often disastrous when production of materials is terminated due to suspension or lack of funding, or termination of the project phase. Pupils' materials in the Bunumbu project, for example, have not been produced since 1984, and the schools involved in this project have reverted to using pre-project materials.

As a general policy in government-initiated projects, materials produced are available to teachers and pupils, free of

charge. The N.P.S.S. (Social Studies Project) texts were clearly marked 'Not for Sale', and so far, this has been successfully maintained. On the contrary, the IDA/ODA textbooks have been spotted in the local market. This goes to show that there is a greater demand for these books than supplies would permit. Some schools are requesting that production be increased and the books put on sale, but this is a decision that the Ministry of Education should take. IDA textbooks are to be shared among pupils at the rate of two pupils per book. However, spot checks to schools revealed that as many as seven pupils share a book. This is because the Planning Unit of the Ministry of Education does not possess accurate enrolment statistics. Syllabi and teachers' guides are distributed as resource materials in in-service workshops. They may also be made available to teachers, on request, when stocks permit, as in the case of KELT materials.

Individual entrepreneurs market their products through personal contact with interested users, or through agents in various institutions. Prices are much lower than those for imported texts. The difficulty lies in the production of insufficient quantities, so that the impact of these texts are felt only by a small minority of users. The absence of appropriate printing and publishing facilities greatly hampers production and marketing.

### ***Lessons to be Learnt***

The initiatives described in the foregoing sections are only a reflection of the wide network of enterprises in the production of educational materials in Sierra Leone. Several lessons are to be learnt from the experiences gained. The following areas require particular attention:

#### ***Expertise***

The question of who should undertake the preparation of educational materials is an important one. While low cost, readily available materials is an obvious necessity, provision should be made for their official assessment, if they are to find their way eventually in local institutions. These assessments should be productive and geared towards improving the quality of materials.

Attention is drawn to the composition of writing teams. A local social worker reported that a guide for parents on effective child rearing practices should have been more useful with the contribution of specialists in child psychology and the participation of working class parents. Similarly, projects on indigenous language education cannot rely only on the expertise of linguists, school personnel and ministry of education inspectors. In the Sierra Leone/UNICEF Indigenous Pilot Schools Project, specialists in language pedagogy and general research methodology were absent in the preparation of materials and at the trial-testing stage.

The CUSO/FLAP experience illustrates a lesson to be learnt from inadequacy in the composition of writing teams. This was a project in which materials had to be locally developed for teaching adults literacy and numeracy skills in Mende and Themne. One of the writers reported that, in his estimation, the project did not take off the ground mainly because it lacked the necessary cultural inputs from the target group. The need was stressed for writers to work in close collaboration with grassroots local resources, and that it is not enough for academicians or intellectuals to speculate about the needs of target groups to which they do not belong. The language used in the materials produced in the CUSO/FALP project was criticized for not being idiomatic. As a result, the users were not comfortable with them.

### *Conceptual and Methodological Issues*

Two instances should be cited here. The first relates to the IDA/ODA Textbooks Project in Science, Mathematics, English and Social Studies. These books were prepared and distributed nationwide to government-assisted schools. Half-way through the process, the World Bank IDA commissioned the University Research Bureau to evaluate the effectiveness, use and distribution of these texts. Regarding effectiveness, analyses were done by a panel of assessors and they noted certain areas of weakness in the content and presentation of the texts. Instances of cultural stereotyping were discovered as were biases in favour of urban children. There had been a major omission in that the texts were not pilot-tested. The project made no provision for this important component.

In terms of distribution systems, mention has already been made of the difficulties encountered in the IDA/ODA Project. The



importance, therefore, of careful conceptualization of projects in materials development cannot be over emphasized.

Dissemination of the content of materials produced is another issue requiring much caution. The criterion of 'multiplier effect' has not always been found valid. One needs to question the assumption that headteachers, supervisors and inspectors, once trained to use educational materials, will in turn train others to use them. Evidence suggests that knowledge and skills acquired by senior officials in in-service workshops are hardly even transmitted to the ultimate users.

Related to the issue of dissemination is building awareness and understanding of objectives. For innovative ideas and new perspectives to be fully understood, accepted and implemented, the wider community should be kept informed. The use of Krio in primary education is likely to be fraught with much controversy unless parents (particularly middle-class parents and the wider community understand the importance of the indigenous language as a medium of instruction. Similarly, it was reported that certain concepts of population education, contained in the texts developed in the N.P.S.S. project, were not well received in older, more established schools. If it is known that educational innovations are slow to take root in conservative institutions, much more should be done to attract the participation and support of such institutions.

### *Budgetting*

This is a sensitive area in projects on materials development where large-scale distribution, over time, is envisaged. Disaster has struck in some projects when funds were exhausted in mid-stream, bringing production to a halt. In the CUSO/FALP Project for the development of an English Language Manual for 'O' level students, the project supervisor warned about the difficulty of embarking on such a venture in a volatile economy, and advised that utmost caution should be exercised when drawing up a budget for providing for frequent revisions in view of escalating prices.

### *Possibilities for Inter-African Collaboration*

It is evident, from the foregoing sections, that experiences gained in the process of materials development, production and

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dissemination are of immense value and should inform future initiatives in this direction.

Given the slow and uneven pace of development in many Third World countries, and in effect, the decline of national economies particularly in the African continent, the future of the education sector is uncertain. Already, in Sierra Leone, all World Bank/IDA projects have been prematurely terminated; among them were projects in education. It is therefore unlikely that resources will be made available in the near future, to facilitate the local development and production of educational materials. One viable solution would be the maximum utilization of existing resources. Inter-African collaboration in this regard would be necessary.

This could take a number of forms, viz:

1. Cooperation at different levels of materials preparation, production and dissemination: specialists from different African countries could come together to decide on content of materials, methodology, production and dissemination.
2. Short attachments can be arranged for personnel in countries with not-so-skilled manpower to other countries in the region where significant strides have been made.
3. A special body can be set up in the region for materials development for schools, with sub-regional centers.

**Appendix****Examples of Locally Developed Educational Materials***Sierra Leone Government/UNFPA/UNESCO Project:*

Sierra Leone National Programme in Social Studies with Population Education

Man in his Environment, Books 1, 2 and 3

Evans Brothers Ltd. 1984.

*Sierra Leone Government/UNICEF:*

1. Indigenous Language Pilot Schools Project

    Mi Seken Ridin Buk: Krio Primer, Pupils Book 2

2. Mi Seken Ridin Buk: Krio Primer II: Teacher's Companion

*Sierra Leone Government/UNDP/UNESCO:*

Training of Primary Teachers for Rural Areas (Bunumbu Teacher College):

1. Teaching Units

2. Curriculum Workshop Guides

3. Primary School Syllabi

4. Pupils' Materials

*Sierra Leone Government/ODA:*

1. Primary Mathematics for Sierra Leone Teachers Book 2

2. Primary Mathematics for Sierra Leone Activity Book 2

3. Primary Social Studies for Sierra Leone Teacher's Guide and Syllabus 2

4. Primary Social Studies for Sierra Leone Activity Book 2

5. Primary Science for Sierra Leone Pupils' Book 3

6. Primary Science for Sierra Leone Teacher's Book 3

7. Primary English for Sierra Leone Activity Book 3

8. Primary English for Sierra Leone Teacher's Book 3

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*Sierra Leone Government/UNDP/UNESCO  
The National Curriculum Dissemination Project:*

Harmonized syllabus for primary schools:

- Language Arts
- Mathematics
- Environmental Studies

*Sierra Leone Government (National Curriculum Development Center)/British Council/ODA KELT Programme:*

Teachers' Certificate  
Language Arts Syllabus

*University of Sierra Leone (University Research and Development Service Bureau) UNESCO:*

Using Krio in Primary Education and Adult Literacy  
A Manual for Trainers

*Institute of Adult Education and Extra-Mural Studies (INSTADEX), Fourah Bay College, University of Sierra Leone:*

1. Texts for the study of Adult Learning and Teaching; Methods and Materials. Compiled by Heribert Hinzen, USL, 1986.
2. The Role of the Teacher in School and Adult Education. By Jonathan Thompson, USL, 1986.
3. Adult Education in Sierra Leone, C. 1870-1939. By Domanic Amadu Turay.

*People's Educational Association (P.E.A.) Publications:*

1. Krio Songs by Ebenezer Calendar: PEA Stories and Songs from Sierra Leone. Freetown, 1985.
2. Krio Adages and Fables - by Chris During.
3. Kapu Sns N Kapu Wd - by Chris During.
4. Love, Women and Men in Stories from Lendeland by Abu Jusufu.
5. Tradition, Song and Chant of the Yalunka - by C. Magbailey Fyle.

***CUSO/Functional Adult Literacy Programme (FALP):***

1. Mende Primers (2)
2. Numeracy in Themne

***Manskay Correspondence Service:***

1. G. C. E. 'O' Level Geography
2. Commercial Arithmetic
3. Teacher's Certificate Entrance Examination: Mathematics
4. Civil Service Entrance Examination: English Language
5. Literature in English: West African Verse (D. J. Nwoga) and an Anthology of Longer Poems (T. W. Mole and A. R. Moon) compiled by I. K. Mansary
6. New France-Afrique. Book one.

***Cardinal Educational Enterprises:***

Traditional Mathematics. WAEC 'O' Level Module One.

***Mary Martin:***

1. Mother Craft for 'O' Level G.C.E.
2. Housecraft for 'O' Level G.C.E.

***Aiah Samgba:***

Exercices d'exploitation pour la méthode France Afrique.

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## Chapter Ten

### **Publishing and Book Development in Nigeria**

*Aigboje HIGO \**

According to the UNESCO Statistical Yearbook of 1983, the entire continent of Africa, with a population close to 500 million and just over 10 per cent of the world's population, produced only 14,000 titles in 1981, i. e. less than 2 percent of the world output of books. Latest figures are not available but I doubt if the number can be more than 15,000 titles, 36,000 of them being new issues. Japan had 1.5 billion books and 34 journals per Japanese. If Africa were to produce and have the same number of books in circulation as Japan, we would be talking of six billion books. Surely, we do not have up to one billion books to boats of!

The situation raises a number of questions:

- Did the 1981 figure relate to the level of education in Africa ? A figure of 0.00003 books per person ?
- Are there policies (educational, political, socio-cultural, economic, etc.) militating against deliberate mass production and distribution of books in Africa, even when most African countries want to be seen to be fighting illiteracy ?
- What roles have governments and the private sector played in the development, production and distribution of educational materials in Africa ?

#### **Historical Sketch of Book Development in Nigeria**

Publishing in Nigeria is still in its infancy even though the foundations were laid over one hundred years ago by evangelising christian missions. Also, around the same period (1846), a printing outfit was established in Calabar. This was some 70 years before the birth of Nigeria. However, a major

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\* Executive Chairman, Heinemann Educational Books, Ibadan, Nigeria.

publishing event happened with the birth of the *Daily Times* newspaper in 1926.

From 1926 onwards, newspapers, political and religious literature constituted the bulk of publishing activity in Nigeria for nearly a century. By 1949, Oxford University Press (OUP) established a sales outlet in Nigeria. Even then, not much "local" publishing took place until around 1955/56, when a few indigenous entrepreneurs (they were their own authors, printers, publishers and distributors) took advantage of the expansion in education (with the introduction of free education in the old Western Region of Nigeria in 1955) to start publishing business. Overseas publishers (mainly British) cashed in on this educational expansion to develop and publish 'local' (in terms of authorship and content) materials comprising books, maps, wall charts, flash cards, etc. These early efforts constitute the humble beginnings of private sector initiatives in developing, producing and disseminating educational materials for formal and non-formal education in Nigeria.

The last three decades have witnessed rapid expansion and development in all areas of education in Nigeria. I shall not try to describe the scope and complexity of this expanding educational programme here. Nevertheless, the explosion of education during the mid-sixties, particularly in the West and East was evidently one outcome of Federal and State Governments' determination to eradicate mass illiteracy. They decided that the best place to start the process was at the grassroots. The active pursuit of this decision gave birth to the Universal Primary Education (UPE) scheme which started throughout the Federation in 1976. By 1980, some 10 million children had benefitted from the scheme.

### **Requirements and Books Development Efforts**

The upsurge in school population led to increase demand for school textbooks and other learning materials. Thus, the biggest chunk of the Nigerian book market is in educational publishing. Nonetheless, the problems of producing textbooks for rapidly expanding educational system with its accompanying new curricula are enormous. In spite of all these problems, the Nigerian publishing industry has lived up to the challenge of giving the country a book development base that will endure. It is

a matter of pride to say that over 80% of books used in the primary and junior secondary sectors of our educational system are locally developed and published by Nigerian publishing houses and printed mainly in the country. These books are all based on home-grown curricula, developed by Nigerians, written by Nigerians who are best placed to appreciate and exploit the psychological, social and educational development of the Nigerian children.

Statistics of education in the country (1987) give an idea of the range of institutions and subjects as well as the number of students we are talking about:

### *Tertiary Level*

	Number of Institutions	Number of Students
Paramedical (Nursing and Midwifery)	88	44,500
Colleges of Agriculture	29	14,500
Colleges of Education and Teacher Training Colleges	42	80,000
Polytechnics	31	64,000
Universities	29	145,000

### *Secondary School Level*

(Includes JSS<sup>1</sup>, SSS<sup>2</sup> and Current O/Level) 12.5 million.

### *Primary School Level*

Meeting the book needs of this large school population becomes more daunting when one realizes that they use not only textbooks, but also workbooks, reference materials, teachers' guides, maps, atlases, etc., in all the fields of study in

<sup>1</sup>JSS = Junior Secondary School.

<sup>2</sup>SSS = Senior Secondary School.



the curriculum. They also need libraries. A rough computation made by Heinemann Educational Book (Nigeria) Limited some time ago is as follows:

- i) approximately 16 million primary school pupils each needing a minimum of 6 books per year = 96 million books
- ii) approximately 12,5 million secondary school students each needing a minimum of 12 books per year = 150 million books
- iii) approximately 2 million post-secondary students each needing a minimum of 12 books per year = 20 millions books
- iv) approximately 0,25 million students in Universities, law schools, agricultural colleges, research stations, etc., each needing 10 books per year = 2,5 million books

The above figures give a total of 268,5 million books.

If we add some projected 12,500 books for nursery and pre-primary schools, adult literacy classes and general readers, we end up with a figure of 281,000,000 books. In an ideal situation, then, the Nigerian school book market needs close to 300,000,000 books per year. In reality, however, there are far fewer books available to the system.

Until very recently, all the books and other educational materials consumed by the educational system in Nigeria were entirely as a result of private sector efforts. Even now that professional bodies (STAN<sup>3</sup>, HSN<sup>4</sup>, GSN<sup>5</sup>, ICAN<sup>6</sup>), State Governments and Government parastatals (NERDC<sup>7</sup>, NTI<sup>8</sup>) have stepped in the role of the private sector, entrepreneur has not diminished.

What these government and quasi-government bodies do is to develop materials and award the contracts for production and distribution to the private sector publishers. There are immense

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<sup>3</sup>STAN: Science Teachers' Association of Nigeria.

<sup>4</sup>HSN: Historical Society of Nigeria.

<sup>5</sup>GSN: Geographical Society of Nigeria.

<sup>6</sup>ICAN: Institute of Chartered Accountants of Nigeria.

<sup>7</sup>NERDC: Nigerian Educational Research and Development Council.

<sup>8</sup>NTI: National Teachers' Institute.

benefits for both sides. Heinemann, which has been in the forefront in Nigeria in this form of joint effort by both sides to develop, produce and distribute educational materials, has a lot of experiences in this area.

In 1872, the Federal Government of Nigeria took a major political decision regarding the structure of the Nigerian economy. As indigenisation decree was promulgated, showing what role foreigners could or could not play in our economy, publishing was one of the businesses affected and the shareholding and control of every foreign publishing firm in Nigeria were restructured accordingly.

Today, Heinemann Educational Books (Nigeria) Limited, Oxford University Press, Macmillan, Evans, etc. operate in Nigeria on the basis of minimum 60% Nigerian shareholding and 40% foreign. They are manned and run by Nigerians. For all intents and purposes, they are Nigerian companies and are treated as such. Together with the many 100% Nigerian owned publishing firms, they form the backbone of Nigerian publishing. When we talk of private sector initiatives in publishing in Nigeria, we talk of these firms and their efforts. They vary in size, composition and orientation. Some estimates put the number of publishers in Nigeria (from one man firms to multi-nationals) at 300. On the records of the Nigerian Publishers Association, we have a current membership of 52 (see Appendix). Some of these publishers not only publish books and other educational materials (in most subjects and at all levels of education), they also diversify into printing, stationery manufacturing, newspaper publishing and even farming.

From the foregoing, it must now be self-evident why most publishers in Nigeria have both legs firmly in educational publishing. Also why, inspite of economic hardships, foreign publishers (particularly British and American) are always around?

Books on virtually every subject sell in Nigeria to the educational system or to the public and the line between an educational book and a novel, a biography or a cookery book is very thin indeed. Apart from general textbooks, a wide range of cram books, do-it-yourself books, questions and answers books, revision books, etc., sell in large quantities.

In fact, most local publishers began with and became known through such books and they are sometimes jokingly referred to as "Q and A (i. e. questions-and-answers) publishers".

Nigerian educational publishers in the main respond to curriculum and syllabus demands. The ministries of Education, with the assistance of curriculum development and research bodies, produce syllabus guidelines. It is often assumed that once the curriculum is made available by governments, institutions or examining bodies, appropriate textbooks magically appear and the system or market place works to select a few dominant texts in particular areas.

Nigerian publishers also keep their ears to the ground. They organize and finance seminars and workshops on their books and courses and take advice from teachers on the need for ancillary texts to supplement course books and major textbooks. This way, they strive to meet the educational book needs of the country at every turn.

It is pertinent to mention that very often, curriculum changes catch publishers unawares. The results can be disastrous for publishers, pupils and the system. Let me give two instances. In 1977, the Federal Minister of Education was in Benin City to open the yearly conference of the Mathematics Association of Nigeria. Modern Mathematics was only some six years old in Nigeria then and most teachers, pupils and publishers had begun to get to grips with it. Mathematics teachers, at every level of education in the country, had assembled to consider the best approaches to modern mathematics. In his keynote address, the Honourable Minister suddenly announced the immediate abolition of modern mathematics. Everybody (including the system over which the Minister presided) was thrown in to disarray. Publishers lost millions of naira in books which they had to throw away or burn. The loss to pupils and their parents has never been assessed.

The second example springs from our present educational structure of 6-3-3-4<sup>9</sup>. When the Federal Government announced the introduction of the system, it had no power to insist that all state governments comply. Some states did, some did not. No

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<sup>9</sup>6-3-3-4: 6 years of primary education, 3 years of junior secondary, 3 years of senior secondary, and 4 years of post secondary education.

publisher knew exactly how to handle the situation until 1988 when the Military Government straightened things out.

Apart from these occasional jolts, Nigerian publishers have done well in meeting the nation's national needs for educational materials. They have successfully negotiated licence rights to reproduce books published abroad but which economic and other factors have not allowed into the country. Unfortunately, government bureaucracy has not allowed the smooth flow of licence fees due to licensors abroad. Unless something drastic is done quickly to ease this flow, books needed to sustain the tertiary level education will become scarce and then unavailable.

### **Adoption and Distribution of Textbooks**

Prior to 1976, the task of selecting textbooks for the primary school system was that of the various school heads. The consultation the headmaster had with other teachers was minimal as he was invariably the most experienced and educated (professionally trained) in the school.

In the Northern States, however, the Local Education Officer (L.E.O.) performed this role. This was a reflection of the level of the staffing in most of the Northern Schools. What was more, the governments supplied books free and they therefore insisted on total control of what books to buy.

The Federal Government's 'take-over' of the supply of books to all the primary schools in the country at the launching of the UPE (universal primary education) in 1976 transferred quality control to the various Ministry of Education officials throughout the country.

In secondary and post-secondary institutions, adoption of textbooks was basically the responsibility of the school heads coordinating the views and opinion of the respective subject teachers. In some post-secondary institutions, boards of studies in particular subject areas (e. g. the Sciences, Social Sciences, Arts, Languages, etc.) sat to review and ultimately select textbooks for the use of the students.

In actual funding of the purchases, there were broadly two systems operating in the country until recently. In the Northern States, pupils were supplied with books free. The various governments reimbursed individual schools with sufficient funds to buy books for all the students and for library stocking. No

parent or guardian bought textbooks for his child or ward. To some extent therefore, in spite of government funding, school authorities determined the textbooks to be used in the various subject areas.

In the Southern States, principals of secondary schools gave out book lists to their students to buy. Parents therefore bore the heavy burden of providing textbooks for their children. And that was a period when a child bought two or three textbooks in one subject. The picture in the primary schools was not different.

With the return of party politics in 1978/79, a new system of textbooks adoption emerged in the Southern States.

The ruling parties strove to score political points over their rivals; some who pledged free education also promised free books. In the area of textbook adoption, therefore, it was a total government 'take over' as school heads lost the authority and responsibility to make selection of textbooks to ministry or political party officials.

Even within the Southern States, the procedure for adoption varied. While some states enlisted the full participation of the Conference of Principals in the initial review of books for secondary schools, others relied entirely on the Inspectorate Division of the Ministry. At the end of each exercise, a list was produced and set to the Education Commissioner's office for ratification.

In recent times, government involvement and authority in determining what texts to use in schools has not diminished. This involvement now takes various forms:

- i) Reviewing various publishers' titles in all subjects - primary, junior secondary, senior secondary and teacher education - for adoption. An omnibus list of titles is produced and circulated among schools and colleges. Heads of schools are subsequently required to select from the prescribed list.
- ii) Setting up task forces or bulk purchasing corporations to bulk buy prescribed titles from publishers. These are then sold to pupils and students at publishers' prices. The underlining philosophy is to bring relief to parents who suffer under the opportunistic pricing policies of booksellers. The system also ensures availability of books to the educational system of the

State. According to one state government, the philosophy is to "make books available to the pupils and students at affordable prices".

- iii) Direct bulk purchase for free supply to schools as in most states in the North.
- iv) Direct Federal government bulk purchase of both primary, secondary and library/reference books for free supply to "educationally disadvantaged States".

Publishers' or the private sector initiatives in the distribution of educational materials are part and parcel of government policy on books. Publishers make books available to the target consumers through regular booksellers, book contractors and the various channels enumerated above. Our retail outlets include departmental stores, chemists shops, hotel lobbies, airport bookstands, etc.

Effective distribution implies satisfactory trade terms for distributors. The standard trade discount on school texts varies from 10% (to libraries and institutions) to 20% (to the trade i.e. bookshops and other retail outlets). General and professional titles attract between 20% and 25% discount, and some fiction attract between 25% and 30% discount.

Publishers consider credit facilities for customers with steady and impressive turnovers over a period - say three years. The level of such facility is determined by the volume and range of business transacted by such customers. Figures range between N 2,500 to N 50,000 on 30-60 days credit. Cheque transaction is, in these days of slow bank clearance, also regarded as a form of credit facility. Regretably, many publishing houses do not accept cheques these days.

Sale or return facility is granted to well established booksellers who are dependable outlets for publishers' titles. As for credit facility, the value of books to be allowed on sale or return terms depends on the strength of the bookshop and each publisher's assessment of likely turnover over a period say three years. Stock is checked on monthly basis, proceeds paid in and replenishment effected.

The major lessons to be learnt from all that has been said so far can be summed up as follows:

- i) A need for correct statistics for up-to-date effective educational planning. Officials, publishers, administrators, aid donors, etc., need accurate figures. All forms of planning have been hampered by lack of figures in Africa;
- ii) A need for carefully thought through educational decisions in the areas of curriculum, textbooks needs and school structure, bearing in mind the needs of each country. This avoids the sort of wastages we have experienced in Nigeria;
- iii) A need for all African countries to stop paying lip service to the education of the masses. In spite of massive private sector efforts in Nigeria, we have only scratched the surface of our educational problems. A political decision to eradicate illiteracy (see the examples of Cuba/India) is what we require from all our governments. If one-quarter of Africa's debts had been incurred on mass education, Africa would be a better and more stable continent today;
- iv) A need to set up the equivalent of our Nigerian Educational Research and Development Council (NERDC) in all African countries to:
  - a) research into educational needs at all levels;
  - b) develop curriculum for all levels of education;
  - c) produce educational materials to supplement private sector efforts;
  - d) review educational developments (from time to time) in the light of national needs.

### **The Need for Inter-African Cooperation**

If African governments are unable or unwilling to see the immense benefits of educational cooperation across frontiers, publishers all over Africa should map out areas and modalities of cooperation and so maximise the resources available in Africa to the benefit of all Africans. After all, if our Governments will not actively aid cooperation, I suspect that they will not stop us. This where it is now imperative for us to make plans for an African Book Congress before long.

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In light of the above, and our experience in Nigeria, one would recommend that all African governments:

- a) abolish (or revise downwards) import duties on all materials for printing books (machinery, chemicals, paper, other hardware, etc.);
- b) make conscious efforts to identify and meet the needs of printers and publishers;
- c) introduce incentives to stimulate local development, production and distribution of books;
- d) meet with booksellers, etc., to map out distribution strategies to ensure that books reach everyone needing them;
- e) arrange to produce under licence all books written by Africans and published abroad;
- f) negotiate publishing rights between African and foreign publishers on a massive scale. If the foreign publishers prove difficult, affected titles should be produced locally in accordance with existing international conventions;
- g) set up paper mills for the production of book printing paper and cover boards to meet local demand by publishers and printers;
- h) commission research by our universities and appropriate institutes into local sourcing for paper, ink, long grain fibre, etc.;
- i) give authors incentives to write;
- j) request our polytechnics, universities and relevant professional bodies (and provide them with funds) to offer courses and apprenticeships vital to the production and distribution of books;
- k) follow the Norwegian example. In Norway, government purchases direct from publishers 1,000 copies of each original work for public libraries. It is also obligatory for major



bookshops throughout Norway to display every new title and keep stock of such title for the first two years of publication. If this is done, it will be an incentive for publishers in Africa to produce certain educational materials which would not otherwise be published;

- l) exchange our raw materials, minerals and crude oil for paper and coverboard with Brazil, Norway, Sweden, Austria, China and all other countries who would wish to give us paper in exchange;
- m) organize an African Book Congress under the auspices of the OAU or UNESCO for participants to work out modalities for inter-African exchange and cooperation in the areas of printing, publishing, rights, translation, paper purchase, authorship, marketing and distribution. This Congress should hold every two years for a start.

These are areas in which inter-African cooperation will be of immense help to each African country and go a long way to eradicate the scourge of illiteracy from the face of our continent.

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## **APPENDIX**

### **Publishing Firms in Nigeria**

1. African Universities Press Limited, New Oluyole Industrial Estate, Phase 2, Ibadan;
2. Africana/FEB (Nigeria) Limited, N°79, Awka Road, Onitsha;
3. Abiprint Publishing Company Limited, Molete, Ibadan;
4. Book Representation Company Limited, Ife Road, Ibadan;
5. C.S.S. (Nigeria) Bookshops, 50, Broad Street, Lagos;
6. The Daily Times of Nigeria Limited, New Isheri Road, Lagos;
7. ECWA Productions Limited, Jos, Plateau State;
8. Ethiopie Publishing Corporation, Ring Road, Benin City;
9. Evans Brothers (Nigeria Publishers) Limited, Jericho, Ibadan;
10. Educational Publications Nigeria Limited, Okigwe Road, Aba, Imo State;
11. Fatiregun Press and Publishing Company Limited, Ilesha, Oyo State;
12. F. & A. Publishers (Services) Limited, Ebute Meta, Lagos;
13. Gbabeks Publishers Limited, Ibadan Street, Kaduna;
14. Goodsight & Sons Limited, Tabon Tabon, Agege, Lagos;
15. Heinemann Educational Books (Nig.) Limited, Ighodaro Road, Jericho, Ibadan;
16. Hudahuda Publishing Company Limited, Samaru Road, Zaria;

17. Ibadan University Press (Publishing House), University of Ibadan, Ibadan;
18. Ilesanmi Press (Educational Publishers), Limited Akure Road, Ilesha;
19. Kola 'Sanya Way to Success Enterprises (Nigeria) Limited, Oke-Owa, Ijebu-Ode;
20. Longman Nigeria Limited, Oba Akran Avenue, Ikeja;
21. Lagos University Press Limited, Akoka, Lagos;
22. Macmillan Nigeria Publishers Limited, New Oluyole Industrial Estate, Ibadan;
23. Nelson Publishers Limited, Ikeja, Lagos;
24. Nigeria Publishers Services, Commercial Reservation, Ibadan;
25. Northern Nigeria Publishing Co. Limited, Gaskiya Building, Zaria;
26. Ogunsanya Press Publishers and Bookstores, Orita Challenge, Ibadan;
27. Onibonoje Publishers Nigeria Limited, Felele Layout, Ibadan;
28. Pacific Correspondence College & Press Limited, Ijesha-Tedo, Lagos;
29. Signal Educational Services Limited, Ibadan;
30. Spectrum Books Limited, Ring Road, Ibadan;
31. Obafemi Awolowo University Press, Ile-Ife, Oyo State;
32. University Press Limited, Jericho, Ibadan;
33. University Publishing Company, Onitsha;

34. West African Book Publishers Limited, Industrial Avenue, Ilupeju, Lagos;
35. Nora Publishers Limited, Erie Street, Benin City;
36. University Services Educational Publishers Limited, Yaba, Lagos;
37. Tana Press Limited, Ogui, Enugu;
38. Paperback Publishers Limited, Oluyole Estate, Ibadan;
39. Edicto Publishers Limited, Ring Road, Ibadan;
40. Executive Publishers Limited, Ikeja, Lagos;
41. A. Onibonjoje Communications (Nigeria) Ltd., Felele Layout, Ibadan;
42. Fourth Dimension Publishing Company, Ltd., City Layout, New Haven, Enugu;
43. New Africa Publishing Co. (Nig.) Ltd., Owerri, Imo State;
44. Literamed Limited, Lantern House, Oregun Industrial Estate, Ikeja, Lagos;
45. Omolayo Standard Press & Bookshops Co. Ltd., Ikere Road, Ado Ekiti;
46. Badmos and Badmos (Nig.) Ltd., 25, Erunbe Street, Abeokuta;
47. Jet Publishers (Nig.) Limited, Awka Road, Onitsha;
48. Nigerian Institute of Advanced Legal Studies, University of Lagos Campus, Lagos;
49. Paico Press & Books Limited, Ette Estate, Calabar;

50. Claudie Limited, Shanu Street, Ikeja, Lagos;
51. Abisega Publishers (Nig.) Ltd., Ibadan;
52. Gbemi Sodipo, Salami Olabode Avenue, Off Obafemi/Ajebo Road, Idi-Aba, Abeokuta.

## **SECTION III**

### **OTHER ASPECTS OF EDUCATIONAL MATERIALS DEVELOPMENT IN AFRICA**

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## Chapter Eleven

### **The Practising Teacher: An Often Neglected Source of Educational Materials**

*Pai OBANYA\**

Seminars, conferences and workshops have been held everywhere in Africa on the problem of educational materials. Participants at such activities have often been policy-makers and policy-influencers: educational administrators, researchers, officials of ministries of education, etc... Teachers, the immediate dispensers of formal education, have not often been involved in these activities. Even when in-service training courses are organized for their own benefit, only a small percentage of teachers are reached.

Spreading new ideas (including newly conceived educational materials) has often been a top-down affair. So, even when in-service courses are organized, members of the top echelons of the profession attend and there is very little evidence that the knowledge and skills gained at such courses get ever transferred to the real classroom teachers.

There are also cases of pilot educational projects being tried out in selected schools. In both in-service courses and experimental piloting, the usual assumption is that new ideas will percolate down the line. That most pilot projects have not had the intended "spread effects", and that new ideas on materials have not moved beyond teacher in-service and demonstration centres point to the fact that the multiplier effect hypothesis can be a fallacy.

One lesson from direct experience occurred in May, 1988 at a workshop on "the teacher as curriculum developer" organized by the Swaziland National Association of Teachers (SNAT). At a stage in the course participants undertook a critical analysis of

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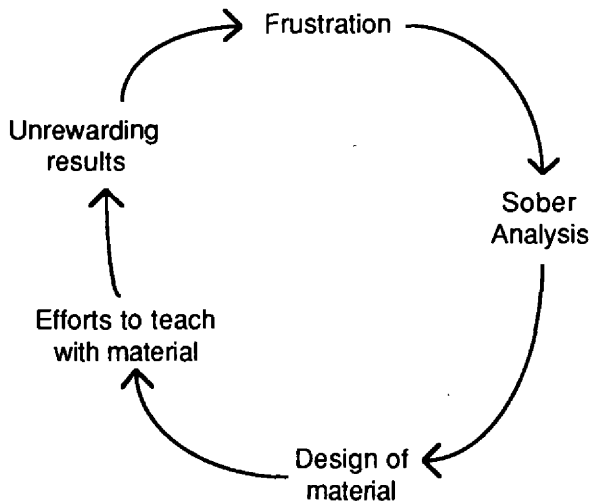
textbooks produced by the National Curriculum Centre and each study group came to the conclusion that most of the books had a lot of problems. When asked what they did to the books in the course of their daily teaching activities, the teachers said that they rejected them and did their own thing.

This paper is concerned with practising teachers, the bulk of whom very rarely get to conferences and workshops, and who hardly have access to new ideas, but who do their best to create materials.

### **The Practising Teachers' Wobbling Efforts**

In the process of seeking answers to a key pedagogical question like "what do I do to get my students to master a given content ?", the practising teacher is often involved in a cycle of activities which often begins in frustration and ends in frustration (see fig. 1).

**Fig. 1: The Practising Teacher's Frustration Cycle**



What figure 1 tries to illustrate is that the practising teacher often finds his task of helping learners to develop their potentials impossible. Facilities are not what they should be, while motivation is often lacking. Yet results are expected from the teacher. Finding performance impossible, most of the time, the teacher ends up being frustrated. Since results just have to be



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obtained, the teacher has to attempt to analyse his situation soberly. From his reflection, he borrows ideas and materials, and puts together whatever he/she and the learners are able to lay their hands on. The materials are used in whatever the teaching-learning situations permit, with often disappointing results. Disappointment arises from :

- a) teachers not mastering subject-matter;
- b) lack of encouragement and motivation from the conditions (physical, material, social, etc) under which practising teachers often work.

In order to change the tone of this discussion from the abstract to the concrete, it would be necessary to see what would happen in specific teaching-learning situations.

### **Some Illustrative Examples**

The following hypothetical situations have a few things in common, namely:

- poor socio-economic conditions which do not allow for adequate financial inputs into education;
- average-ability children coming from homes without any special facilities;
- a curriculum that requires active participation by the learners and efforts by the teacher to maximise the impact of learning activities;
- teachers who are trying to do the best that their training, experience, and general conditions of work would allow them to;
- schools and classrooms crying for basic facilities.

This looks like the general picture in which most teachers work in many African countries. Whatever may be said of these conditions, teaching and learning do take place, and teachers and learners do create educational materials. Where materials are not created (in the sense of being physically made) prevailing social situations and physical/natural features are often exploited by teachers to make learning possible.

To make the discussion more concrete still, let us consider each of the following cases in which a typical school teacher

would analyse prevailing situations and create appropriate materials.

Brief Description of Situation	Factors Likely to Influence Choice of Material	Possible Use of Material
<p><b>A.</b> A group of 50 six-year old village children during their first few weeks in a school (all grouped in a single classroom) to explore the world around them, using their mother tongue, <i>Bemba</i></p>	<p>- the age and the environment of the children, as well as their oral mastery of their native language; - the existence of older folks/activities/festivals etc. in community.</p> <p>These factors could lead to teacher and learner collecting them (where possible) plants, leaves, soil types, traditional dresses, photographs, (where possible) food crops.</p>	<p>- activities (e. g. games) are initiated involving the manipulation of the objects collected; - discussions are also often held around the objects and activities; - projects (individual and group assignments) can also follow from earlier activities to varying degrees, the group will succeed in using language to carry out activities and could improve on its understanding of size, shape, colour, inter-relations, etc.</p>
<p><b>B.</b> 40 Children aged 8-9 years in the third year of primary school, only four books available for reading and writing practices</p>	<p>- the size of the class; - possibilities of rearranging classroom settings; - existence/non existence of related teachers.</p> <p>These factors could lead the teacher to:</p> <ol style="list-style-type: none"> <li>a) copying out reading texts on cardboards;</li> <li>b) reproducing texts on flip charts;</li> <li>c) tape-recording the texts for audio exercises;</li> <li>d) re-arranging classroom to enable 10 children have access to one book;</li> <li>e) borrowing texts from other classes or schools, etc.</li> </ol>	<p>- language activities in reading and writing would be carried on the varying degrees of success; - motivation for reading could develop in some children; - the teacher would each time improve on his/her previous arrangements; - in writing and reading practice some of the children would themselves improvise.</p>

**C.** Children need to have a feeling of TOPOGRAPHY. No maps available. Only 4 atlases for 55 4th year secondary school boys and girls

- the fact that the emphasis is on a feeling for topography;
- the fact that atlases, even if they existed, would not have given learners this "feeling";
- the nature of the physical environment around the school.
- socializing through group work, could have been inculcated;
- finding out, by doing, would also have been imbibed;
- the concept TOPOGRAPHY is also likely to have been more thoroughly grasped.

These factors would lead the practising teacher to consider:

- field work on the physical landscape around the school;
- work in groups to mould land demarcating the product according to height.

**D.** In the third year of secondary school only 11 of the 52 children in a class can grasp the concept TRIANGLES. Lines drawn on the board do not seem to mean anything to them.

- the fact that there is always symmetry in nature;
- the learners' ability to count and to measure.
- the classroom would have expanded its walls to enable learners move outside;
- a mathematical concept would have been seen to have a bearing with nature;
- the activity could lead to related self-directed activity by learners.

Such considerations could lead the teacher to collect strings, bits of sticks, cardboards, disused plywood, etc. Led by the teacher, the learners (a) pin sticks at various points in the ground, (b) use strings to draw lines among them, (c) observe angles in real life, (d) draw these live angles on paper.

**E.** Your science laboratory has neither water nor electricity, nor chemicals. Yet 32 boys and 21 girls are keen to understand basic scientific concepts.

- the children's favorable dispositions towards science.
- the fact that water, electricity, and chemicals exists in the environment.
- Science in the school is likely to become more related to the environment;
- lessons are likely to involve both teacher and learner really doing

They have memorized symbols, terms, definitions, but they are anxious to be able to link science with life.

These factors could lead the teacher to teach science in life situations. Thus he will collect used cans, bottles, sticks. He will collect wires and batteries. He will see what applied scientific activities (cooking, crafts, farming, cottage industry, building, etc.) exist in the environment. He will sequence his science lessons to relate them more to MAN AND SCIENCE e. g.

- using and preserving water,
- using and preserving food,
- harnessing the powers of air and water,
- raising plants and animals,
- getting objects to move, etc.

For each sequence of lessons, he will think of appropriate environmental resources.

something;  
- concepts are likely to be grasped and definitions, symbols, terms better understood.

**F. Your school is located in the centre of a busy African city. Yet the authorities say that AGRICULTURAL SCIENCE MUST BE TAUGHT**

- the fact that agricultural science is a lot more than crop farming;
- the extent to which agriculture, in all its forms, is practiced in the environment;
- the fact that agriculture also influences the socio-economic life of city dwellers;
- the fact that some of the children and their parents may have seen real agriculture in practice.

These considerations may lead the teacher to restructure the School programme to emphasize (a) crop growing in miniature form, (b) animal/bird raising in the little space available,

- the restructuring of the programme would lead to the development of new materials (e. g. cages for birds, growing of vegetables on balconies, etc).

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|--|---|
| (c) visits to real farms,  |   |
| (d) the economic and social bases of agriculture (e. g. crop and food marketing),  | - market visits/farm visits/factory visits would enable learners link agriculture more closely to scientific and social life. |
| (e) the technical aspects of agriculture (e. g. agric. machines, the manufacture of herbicides/pesticides, food processing, etc.). |   |

In all these cases, certain points emerge about educational materials. The first point is that educational materials are not just textbooks. Of all the six situations books, as educational materials were mentioned only in passing, in relationship to something else.

The second point is the close relationship between methods and materials in educational practice. In each of the situations, a number of objectives are envisaged (as shown in the third column in the tabular presentation above). Agricultural science aimed at linking agriculture with larger scientific, economic and social life, school science is intended to involving both teacher and learner in actually doing science, etc. Thus, materials are not educational simply because they have been officially or commercially designated for schools. They become so only when they play the role of helping the learner learn better and helping the teacher teach more effectively.

A third point, related to the above, is that there is a clearly defined chain of activities involved in educational material development. The practising teachers in our examples have in all cases:

- a) analysed the dilemma of peculiar teaching-learning situations;
- b) explored the environment to see what can be obtained from it;
- c) involved learners in varying degrees of collection, arranging, etc.;
- d) subjected whatever has been collected, identified in the environment, assembled, produced, etc. to use in classroom and school settings.

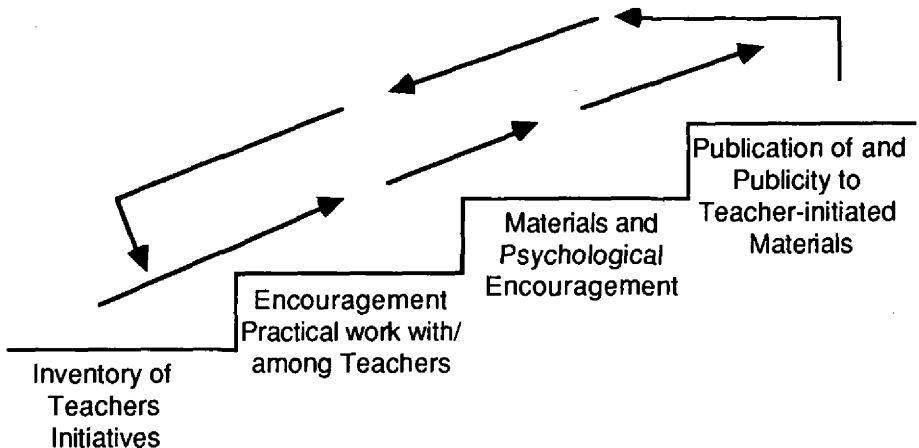
The fourth point is that a large number of teachers actually conceive of materials in the course of their day-to-day activities.

These materials, in most cases, are neither fully developed nor produced. The frustration cycle illustrated in figure one is the result of our failure to capitalise on practising teachers' ideas on educational materials. To reduce the frustration, positive action is necessary.

### Getting the Practising Teacher out of the Frustration Cycle

Figure 2 illustrates a number of steps which can be taken at various levels (local, national, sub-regional, regional, etc.) to mobilize practising teachers to really develop their original ideas on educational materials for immediate improved teaching and learning and for the overall improvement of qualitative returns to investments in education.

Fig. 2: 4 Distinct Steps in Harnessing Teacher Efforts in Material Development



It would be necessary to explain each of the four distinct steps briefly.

- a) *Inventory of Teachers Initiatives*: As was said earlier, a large number of teachers are analysing teaching-learning situations and are creating appropriate materials for use in reducing teaching-learning problems. The making of "apparatus" is part and parcel of teacher education programmes. Every locality,

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every nation needs to establish appropriate means of knowing the teacher-made "apparatus" available in schools.

- b) *Practical Work with/among Teachers*: A possible second step to harnessing teacher efforts would be to use their initiatives as a starting point for any training programmes in educational material development. Such programmes could involve teachers sharing their ideas with other teachers (practical work among teachers), in addition to specialists (e. g. educational technologists), using teachers' original creations as a basis for more appropriate creations by teachers under workshop conditions (i. e. practical work with teachers). Working among teachers would improve the effectiveness of working with teachers, as materials have to be realistic (i. e. closely related to solving real teaching-learning problems) to be of any use.
- c) *Material and Psychological Encouragement*: Whatever the methods used to harness teacher potential for educational material development, some form of motivation is necessary. Material motivation would take the form of gifts for work well done (e. g. trophies, certificates, honours lists). These are useful in encouraging teachers to develop their original ideas on educational materials.
- d) *Publicity and Publication*: Publicity is itself a form of psychological motivation. That a teacher's effort is nationally acknowledged can be a source of reinforcement to the initiator as well as to other teachers. The exact form of publicity will depend on what works best in each locality.

Publication will mean large-scale production of materials produced by practising teachers. The advantage of such materials would be that they would have gone through the stages earlier discussed (analysis of specific teaching-learning situations, choice of relevant resources, variety of needs, etc.) Such materials are also more likely to be adopted by teachers, as they can easily see the link between their classroom teaching-learning goals and the educational materials recommended to them by educational authorities.

## **Conclusions**

The purpose of this chapter has been to emphasize that inspite of the poor state of communities, schools, classrooms, and teachers in Africa, a reasonable amount of material development (inspired by practising teacher) still goes on. In most cases, the efforts of teachers end in frustration, for both the individual teacher and the entire education system. There is therefore a need to mobilize creative teachers, to improve their creative capacity so that more appropriate educational materials can be produced and used in African schools.

The emphasis has been on what teachers can and infact do to create appropriate educational materials. Even though books remain a problem in African education, non-text materials are even more of a problem. There is a tendency to think of these as expensive, but costs can be considerably reduced if teachers' modest efforts are given impetus by educational authorities.

There is inface a huge potential for educational material development in Africa. In the villages and hamlets, in dilapidated school buildings, in over-crowded classrooms all over Africa, a large number of teachers are creating materials. The potential of this long-neglected majority of material developers has to be tapped.



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## Chapter Twelve

### **Production of Educational Materials: Some Out-Door Examples**

*A. N. BOMA\**

The initiative of teachers towards the production of educational materials is being depleted as a result of educational materials' dependency upon imported types. It is difficult to see how the educational practitioner can effectively perform when Africa, hit by financial crises, is finding it difficult to feed its population, let alone the procurement of educational materials. This lack of educational materials' dependency has to be redressed if self-reliance is to be achieved in all the sectors that contribute towards African educational, scientific and cultural development.

Paying lip service to the local production of educational materials is not enough. Realistic solutions to the production of educational materials have to be found in Africa by Africans through the self promoted initiative of African educators and educational technologies including the industrial sectors.

One area where there is a quantum of educational materials is in the publication sector. In this sector, African scholars have to be given some credibility to locally produced and published texts. But how often do we see African writers quote texts from the works of African authors? African authors are more prone to quoting foreign authors and this tantamounts to placing a delicate balance between the work of African authors and external ones. Our libraries are loaded with the works of foreign authors, sometimes very obsolete and it is about time our educational authorities and scholars think of equipping our libraries and personal bookshelves with the works of African authors. It is by doing this that the credibility of African authors and publishing houses can be sustained. It can also be argued that locally produced books besides being very situational and

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relevant, are cheaper. The African economic crisis has come to stay for at least a while and we cannot afford the luxury of spending unwisely.

One area of concern in which availability and production of educational materials is very deficient is in the teaching of science and technology. This is so, firstly because of the low level of educational technologies and industrial development in Africa and secondly, because teacher-educators and teachers were trained in these fields applying test-tubes and steel-bars. Such a crop of professionals simply regurgitate the means and methods by which they learnt the subject(s). They are victims of the test-tube and steel-bar mentalities. In the absence of these imported gadgets the pace of learning science by the African pupil is slowed and his ingenuity to reason scientifically is hampered.

In order to improve the teaching of science and technology, improvisations, prototypes and outdoor laboratories have to be applied. Through the use of these locally produced materials, children develop scientific notions and applications at an early age rather than wait until they have entered secondary schools to be exposed to the use of test-tubes in the learning of science.

The child first learns whether instinctively or cognitively by being exposed to his social, economic and cultural environment. These environmental factors are constant and should first be capitalized upon in order to develop the child's transfer ability.

Effective learning takes place in an interesting environment and for the child the out-door situations seem to offer the best potential. The child using the natural phenomena in learning comes into reality with the inter-relationship of things and progressively learns in an interdisciplinary manner.

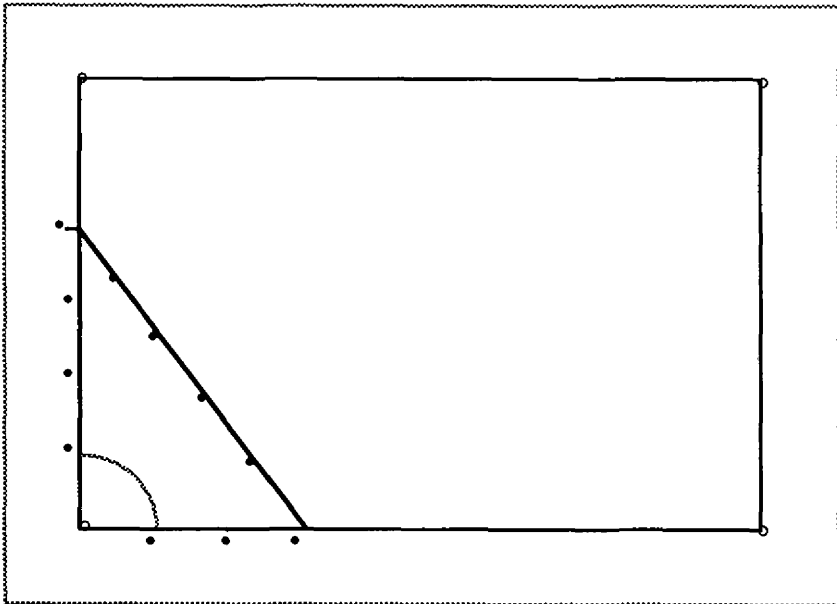
One of the manifest ways of employing the scientific approach to teaching is the example of IPAR Buea, Cameroon' experience which employs the school farm as an outdoor laboratory. Efforts over the years show that the school farm is an effective out-door resource material which can be employed in the teaching of diverse school subjects.

In most of Africa, there is land for the asking and it takes a resourceful teacher to acquire school land from community leaders. The establishment of a school farm does not call for heavy outlay. Tools, seeds, fertilizers or compost manures and other small livestock are minimal in terms of costs. The IPAR Buea school-farm establishment data reveal that a school farm

can be established for as little as US\$ 200 or 60.000 Francs CFA. The funds are mainly utilized for the purchase of a few farm tools.

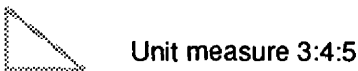
When land has been obtained, the lay-out of the school farm begins with the use of simple educational materials. The lay-out of a rectangular plot for example, starts with the triangulation process. Children do not need to be introduced to the pythagoras abstraction theory before the lay-out of right angles on a farm plot. All that is needed in an outdoor situation is the use of any local unit of measurement. This is shown as the 3:4:5. The Unit can be made with some bush twigs, corn stalks, elephant stems or bamboos. When the units of 3:4:5 are placed end to end, a right angle is obtained for each of the four corners of the farm.

**Setting Right Angles on a Plot**



**KEY**

— Rope      • — Unit measure      ° Pole



Each corner is established employing the 3:4:5 units until the rectangle has been established. Each time, the 3:4:5 measure is placed at a corner of a farm where a pole had been established, the rope is stretched alongside the 4 unit measure to the next corner where again 3:4:5 units have been laid in a similar manner until the 4 corners of the plot have been laid at right angles.

After the lay-out of the farm plot employing the 3:4:5 measures, other activities that can be learnt include figures such as a square, a rectangle or a parallelogram.

The growing of crops and harvesting them can provide ample opportunities for scientific approach prior to the use of test-tubes in a classroom situation. In the process of harvesting maize, pupils perform the following tasks:

- observation of varieties;
- harvesting and sorting in terms of varieties and sizes;
- classifying in terms of varieties and sizes;
- counting the number of cobs;
- weighing of the maize;
- drawing conclusions as to crop yield, damaged cobs and resistant varieties.

In short, this amounts to the scientific approach whereby the stages of observation, data collection, analysis and inferences come into play.

Through the use of the school farm as an outdoor teaching resource, the pupil comes into reality with the importance of farming - economic, social and cultural and of the learning attributes. He is able to see the inter-relationship of crops, peoples and climatic conditions. Thus, abstraction becomes the end result after the analysis process.

Another example of an out-door educational material is that of employing a ground map. Again the pupil sees the presentation of the map in its physical and topographical realities. He is not brought to abstraction and consequently a cumulative institutional memory, albeit a selective and sometimes disorganized set of facts.

As we have seen in classroom situations where maps are hung up on the walls, children are always under the misconception that the top part of the hanging map is always the north ! This falsehood could be avoided when a ground-map is

employed.

The subject of the illustration of setting a ground map is not to be documented now but merely to emphasize an aspect of out-door teaching aid or resource.

Concluding therefore, let us use the educational materials we can produce and produce the educational materials we can use and not develop a negative attitude towards our locally produced educational materials.

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## Chapter Thirteen

### **Consideration of Needs and Means in Educational Materials Production**

*Jan M. DE BOSCH KEMPER\**

It is now already over 15 years that I was impressed by an educational research activity going on in Uganda. The researcher's concern was about classrooms and specialized equipment which are hardly needed, provided the curriculum would be highly adaptable and the teacher highly motivated. "It works" he said. Teaching and learning materials he found all around on the schoolground and in the village: trees, collections of rocks and rejected tools were used: no materials were specifically produced for teaching purposes; his teaching technique was principally based on the "discovery method".

I have learned since then that what may work in a small scale project does not always work when generalized. On the contrary, the major problem occurs when the multiplication factor enters the scene.

Teachers are not always highly motivated. Class sizes cannot be controlled and are increasing, school furniture is lacking, proposed teaching and learning materials as well as stationaries are not available... It thus appears very important to know the social and economic context in which a proposed education system, or any particular part of it, has to be implemented.

A project in which I was personally involved, for instance, came to a standstill because of the introduction of productive work at the termination of primary education. It was envisaged that pupils produce utilities to recover part of the costs of productive activities. Utilities in the market which were imported from Asia were much cheaper and of longer life. It was impossible for parents living at subsistence level to buy the product for their children. There was no way of getting a source

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of financing the generalization of this project.

Also, we experienced in other instances that what is meant as "low-cost" is in fact not low-cost at all (not in any way the lowest cost at which a particular piece of equipment could be obtained), while in some case, we argued that a proposed development strategy should be earmarked as positive for the development of regional, national, or local economies.

In traditional functional design, "form follows function", that is to say: teaching and learning materials are developed to support a curriculum. But, ... in a situation where resources are limited, it is often the available material that conditions the success of the teaching-learning process. This reality is often badly appreciated. Regardless of the numerous efforts to be realistic, we keep designing projects in the hope that the economic situation will change; we keep hoping for a miracle. Consequently, the reality takes us somewhere ..., we adjust to situations rather than control them.

Facts and figures as regards educational materials provision are difficult to obtain. At the level of BRENDA, we posed some questions on the matter in preparation of school construction seminars. One of these investigations told us that in 12 French-speaking African countries, an average of 50% of materials would be available in urban primary schools; for rural schools, 38% of actual requirements would be available. On another recent occasion, we noted that in three semi-urban public primary schools chosen at random, 33%, 80% and 18% of requirements for teachers were actually available at school level, while these figures for pupils amounted to 20%, 5% and 15% respectively.

Although no accurate figures on the provision of teaching and learning materials in schools are presently available for the Africa region, we can safely say that on the overall (in the public system) less than half of the requirements is presently available and that a figure of 20% would be nearer to the reality for many countries or regions.

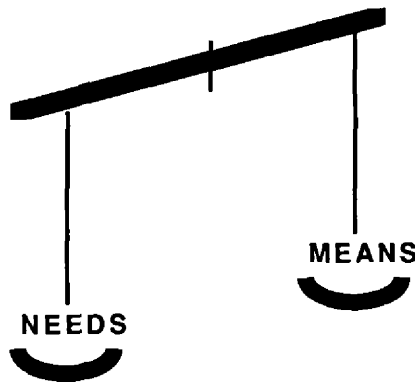
And this makes our problem the multi-million dollar question in practically all African States.

Through our efforts and under pressure of outside forces, the balance between needs and means to satisfy these is progressively being distorted:

- Needs are being increased by educational reforms, by modifications in curricula, by increasing enrolments, by poor maintenance standards...
- Means are being reduced through loss of priority status for education, deterioration of economic situation, poor organisation of production and distribution...

How do we get out of this situation? This, to me, appears one of the questions, we should pose to ourselves, as the possible answers may be the seedings for future action.

**Figure 1: The balance is progressively being distorted**



In this context, the problem of educational materials should of course not be seen in an isolated way. There are other questions requiring attention and resources: the classrooms, the school furniture, the provision of storage facilities and services such as water and sanitation, also in deficit, and the general condition of the teaching profession to be improved.

I will not attempt to give a comprehensive answer to the above problems as quite honestly I cannot, but I would like to put forward below some ideas and reflections for consideration.

### **While Increasing Means, We Should Reduce Needs**

The imbalances referred to above should be reduced through combined action, i. e. reducing needs while at the same time increasing means. There is no way for improvement of the situation, when additional resources keep being swallowed up by additional demands.



## **We Should Regularly Re-examine and Re-classify Constraints and Resources**

Let me mention at this juncture, that there is a lot of misunderstanding about resources and constraints. Some resources are in fact constraints while some constraints are in fact resources. Expecting training material to be available at schools, and being trained to use it as a vehicle, certainly turns the non-availability level of this equipment, the resource into a constraint.

What about the time factor? Is it a constraint or resource? It all depends on a proper appreciation of requirements. And what about administration and management? Is it a resource or constraint? It also depends on a proper appreciation of requirements.

Through lack of in-depth thinking, we often get into the "solving" of secondary and sometimes non-existing problems and in some cases our "remedy" worsens the situation.

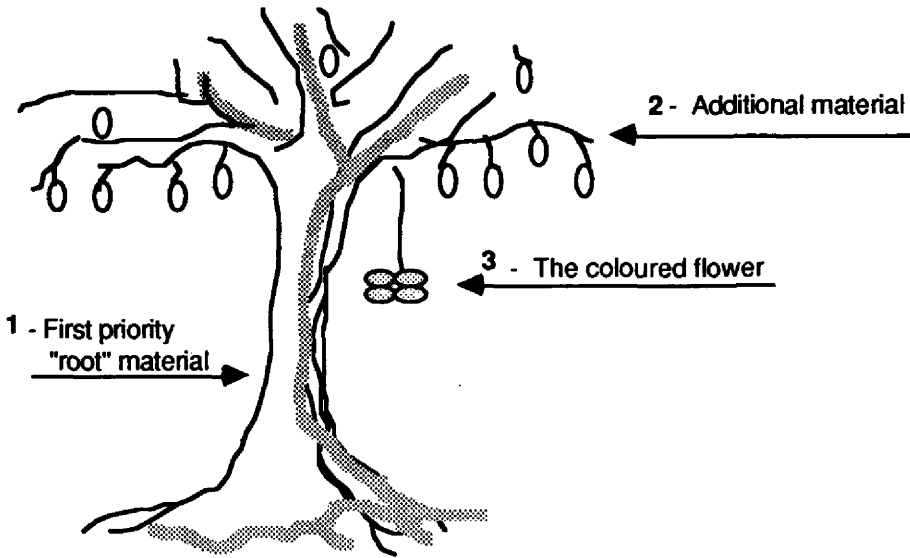
## **We Should Improve Data Base and Information Flow**

While this proposition is quite evident, I would like to state that data on the system of education is of much importance. There is a need for a better diagnosis of the existing situation in terms of quality, quantity, utilisation, effectiveness, manufacture, maintenance, and costs of educational materials. There is also a need to take an inventory of development potentials systematically. And the collected data will have to be made easily accessible to the public concerned.

## **We Should Deal with Priorities First**

We could reduce requirements, "needs" or norms, by starting for the time being, with the provision of basic minimum skeleton type of materials. What did some teachers do? Tired with waiting for the official booklets to come, they printed at their own initiative "root" materials (hardship can make one resourceful). Without putting any quality judgement on this particular experience and other initiatives, I would say that as an official sustained strategy, the priority publication of "root" materials, might be of an advantage, at least it will take us somewhere we intend to go.

**Figure 2: Development of Educational Materials by priority**



Some might argue that, considering the noted importance of educational materials in the learning process, reduction or simplification of them comes down to the reduction of education standards. In fact, the adoption of this strategy would only concern the lowering of a proposed norm that could not, for the time being, be achieved; the lowering thus, of an illusion.

Nothing will limit us, once we have come to grips with reality and thus having laid a better foundation to develop, as a next step, education to a highly sophisticated level. Adapting this strategy, the development of more sophisticated materials does not have to be prohibited. It can be undertaken straight away, but should not be a priority.

When the skeleton is properly designed, this more sophisticated material can be added without constraint (like leaves and an occasional flower on a tree, like meat on the bones).

### **We Could Think in More Cost-Effective Terms**

Products should be more cost-effective, or of better quality, and also be more useful. About quality, I would like to remark that the use and recuperation of materials and local production,

success stories exempted, has often resulted in the provision of poor quality and less durable books and equipment. A lot of enthusiasm and in particular human resources are invested, yet effects at the classroom level are limited. Why is this? May be the approach is too puritan, too idealistic, certainly the material resources being made available are too limited. When we want to succeed, the inputs for educational materials production will have to be increased beyond the "cottage industries" level.

Coming to the utilisation of the materials themselves, of course, this also affects costs. For instance, the text in a book is seen by some eyes only, a poster can be read by hundreds. A poster may thus be much more expensive and still be more cost-effective.

In the choice of science equipment, this matter of utilisation is a central issue. The impact of chosen material on the performance of the educational task, will have to be evaluated and cost effectiveness assessed.

To improve cost-effectiveness, it is important to provide for proper operation and maintenance.

### **We Should Provide an Appropriate Task for Everyone**

To solve the problem, every resource available, be it public or private, large or small scale, local or from abroad, should be tapped if appropriate.

Why not let a child do the colouring when colour print is expensive? Why not use existing industries to do part of the job? Rotation presses for instance can also produce reading materials and indeed teaching and learning materials for schools. Different local craftsmen and industries could be considered for part of the job of producing educational materials, while many common utilities can also be used for this purpose.

### **Official Education Materials Production Policies Should be Formulated**

To guide development of the sector, policies should be formulated and sustained. Questions concerning monopolies on educational materials production, the provision of paid books, etc. appear to me very delicate. On one hand, production and provision should be free, as much as education is a basic human right. On the other hand, unguided production may result in

exploitation of education as a business (especially where it concerns basic education in low income countries, not very ethic) and duplication of efforts which will not be economical. Every country should, in line with its socio-economic structure and physical realities, have to define an appropriate framework.

### **Technical Cooperation**

In conclusion, I would like to make some preliminary observations on opportunities for technical cooperation.

Of course, in the first place, we should stimulate information exchange. Why repeat a failure? Why re-invent? Also, I believe this information exchange, provided efforts are correctly evaluated and failure can be recognised, and author as well as industries accept this free flow, can be encouraged without problems.

The setting-up of common production plants, is of course a different matter. This requires a lot of lobbying and a sustained political decision. As far as I know, presently, practically all countries in the region have the production possibility of school books on a national basis. This appears to be a question of prestige. Countries should be made to share these facilities. In addition, one could and should study the possibilities, within economic blocs, of common industrial production of science and technology equipment.

What appears to me presently to be the most interesting possibility of cooperation within a UNESCO/NEIDA framework, is the setting up of a "common information/consultation/services platform" through which African States can help each other with the strengthening of production, distribution and maintenance facilities. Within the framework of UNESCO, additional inputs to the strengthening of this development base can be acquired from outside the region, while financing of such an operation could be requested from the United Nations Development Programme, other United Nations agencies, governmental and non-governmental organisations, as well as regional development banks.

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## Chapter Fourteen

### **Innovations in Educational Materials for Science and Technology**

*Samba DOUCOURE* \*

According to *Le Petit Robert*, *didactic* means that which aims at teaching, which belongs to the language of the sciences and technology. This second part of the definition of the word is undoubtedly to be used here.

We will describe didactic "any material which has been produced with the aim of facilitating learning. It must also be accompanied by a pedagogical utilization-guide, and indications about target populations and it should have been tested successfully".

We can classify educational materials into six main groups:

- classroom materials: blackboards, chalk, tables, school desks;
- printed materials: textbooks, pedagogic guides and sheets;
- drawings, diagrams;
- audio-visual materials: slides, films, transparencies, softwares;
- models;
- equipment and materials having an educational character for laboratories and workshops.

An educational material is thus "any material necessary for teaching or the carrying out of an activity by the learner".

In basic education (primary and lower secondary education), classroom materials are available in all schools. Drawing instruments are generally imported. Madagascar possesses a national production structure for these materials. Blackboards, tables, table-benches are produced totally either by private production structures or by technical and vocational educational institutions. Chalk production by African States is increasing (Ethiopia, Mali...). A major effort was made in the

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\* Chief Inspector of Technical Education, Bamako, Mali.

donation of printed materials produced locally to primary education. Science Education suffers from lack of laboratory materials. However, major efforts are being made out in Côte d'Ivoire, Ethiopia, Madagascar.

The natural sciences create less difficulty in comparison to physics. Teaching natural sciences is based on the resources in the surrounding environment in which the pupil lives. Not much technology is taught in primary schools. It is only sessions of manual work or productive activities which are carried out. This approach does not make it possible for the objectives of technological education to be reached. Technological education being defined as "a group of school activities in general education through which the pupil studies and produces technical objects by the organization of the knowledge and know-how common to the sciences and technology in the hope of satisfying a need".

Technology is introduced in the secondary school (lower school). It is a type of education which remains localized in the majority of states given the lack of appropriate materials and premises. In Mali and Senegal, the teaching of technology is for pupils in schools geographically situated around well-equipped pilot centres.

The pupils go there to take technology lesson. This same method is used for teaching science subjects. These centres were acquired through by loans from the World Bank (Mali, Senegal).

A second experiment is going on in the rural areas in Mali teaching there is more concrete and closer to the local context. There too, they are pilot schools financed through external funds (World Bank).

Manual work and small-scale productive activities are undertaken despite the number of pupils in elementary education but lack of preparation of the teachers and absence of materials do not make it possible to achieve the objectives of technological education. The institutions are equipped with laboratory materials. The equipment is often incomplete and do not make it possible for science experiments to be carried out. The problem here is the ordering and distribution of material. Newly opened institutions totally lack equipment in Mali and this does not help science education. When the material exists, no instruction leaflet to guide the teacher on its uses accompanies it. Technological education has not yet been introduced in

general secondary education. In teacher training schools, on the other hand, technology is introduced in the training of pupil teachers as an independent discipline.

Technical and vocational education has adequate equipment and qualified human resources. The main problem in this type of education remains the replacement of tools and working materials and sometimes follow-up difficulties of technology development when it comes to acquiring new equipment.

### **The Demands of Educational Materials Production**

It must be repeated that evaluation is a fundamental fact of the pedagogical act, for the teacher who is already in service as well as for the teacher who is learning. The teacher in his teaching and the pedagogical team in the school must evaluate not only the results obtained by the pupils but also the methods and ways implemented to get them there.

#### ***Curricula and Textbooks/Laboratory Materials Specific Materials for Technical and Vocational Education***

Central structures of national education develop curricula and are equipped with printing materials for productions but in reduced numbers and of average quality (roneo, offset, computer-assisted publication). There are, however, a few large textbook production Units in Africa, for example in Benin, Nigeria, Kenya.

In Senegal, teachers in lower secondary schools are introduced to the manufacture and maintenance of educational materials in workshops of science and technology blocks. A specialist whose activity covers the whole Senegalese territory has been appointed to accomplish this mission. In Côte d'Ivoire, the National Centre for Scientific Material, set up in 1977, takes care of the choice distribution and maintenance of scientific materials. The centre has also carried out training in the utilization and manufacture of educational materials. The manufacturing section has not yet got off the ground.

Let us point out that IPNEIP of Abidjan has been producing quality printed educational materials and apparatus models for several years now. Ethiopia and Madagascar have production

centres for laboratory materials whose mission is to satisfy national needs. In Mali, National Education has two small printing works for printing brochures and educational cards. Prototypes of scientific materials are manufactured in the Higher Teacher Training College of Bamako in a workshop equipped by the FAC. The technical education division of the National Département for Secondary Education also produces prototypes of scientific materials for general education.

Research and production are carried out in educational institution according to an annual programme planning.

Activities are coordinated by the division for technical education. The material developed concerns all sectors of technical and vocational educational: agricultural education, industrial education, tertiary higher education. These materials are designed and manufactured according to needs expressed by professional training structures.

These are mainly documents for tertiary education aiming at making training more professional, and small booklets useful for their contents and for imposing a more active pedagogy. For the industrial sector brochures and technical materials are produced from the utilitarian (self equipment) and pedagogical angles.

### ***Actions in Favour of the Handicapped***

The physically handicapped and the blind are accepted for training by two national structures: the Centre for the Physically Handicapped and the National Institute for the Blind. Pupils from these two institutions go to ordinary schools after obtaining their "Diplôme d'études fondamentales" (DEF) - primary school certificate. Physically handicapped pupils practically use the same materials as "normal" pupils. Blind pupils have three types of materials:

- Educational materials designed for the sighted and usable without any adaptation by the blind: scales, cube, skeleton, cut-away diagrams;
- Educational materials for the sighted which need some adaptations: compas with two sharp points, appliance for marriot box experiment using tactile indicators;
- Educational materials designed specially for the blind: maps, diagrams, globe, scoring-board counter. A workshop attached



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to the institute makes it possible to manufacture certain educational materials whose production in Mali costs less (maps, diagrams, scoring board counter).

Utilization of imported educational materials create a lot of difficulties for teachers in the institute. Locally manufactured materials on the other hand are used a lot. Generally they are produced by the teachers themselves. Needs in scientific educational materials for primary education of the institute are fully covered.

### **Dissemination of Educational Materials**

If the problems concerning the design of educational material seem to be easy to solve, their mass production and dissemination come up against almost insurmountable difficulties.

#### ***Textbooks***

Textbooks are as costly as their number is limited. Publishing a textbook presupposes continuity in quality and time which is already difficult to obtain. Publication is only justified if a considerable amount of books are used by the school population. The non-usage of textbooks is obviously dangerous because it creates negative educational habits. Renewal of knowledge and educational processes, restricts the length of time the textbooks are used, making their cost even higher.

Efforts can be made to limit the costs of textbooks produced outside the country. The choice is not always good and apart from the technical aspects, it can have serious consequences. There too, evolution is rapid and teachers always wish to have the most recent book. The problem appears unsolvable when difficulties due to bad organization of the dissemination circuit are further added to it. Getting supplies is difficult, the market is small and bookshops only agree to order books from abroad when they are sure of a sale. These considerations justify a step by step approach starting, from the production of booklets, lesson aid then eventually as the basis for a textbook if the necessity exists. These booklets used in class are subject to continuous improvements, they can thus constitute the basis for a textbook, the fruit of experience from several people.

### **Laboratory Materials**

It is hard to find firms specialized in the sale of laboratory materials and after-sales service is rarely provided. Supplying teaching institutions with laboratory products faces a conditioning problem. The needs of institutions taken individually are few and storage of chemical products is always delicate.

The first action to be undertaken in the promotion of educational materials at national level is the setting up of a department responsible for development and production. This department must have two separate units: one unit for printed materials and one for laboratory material and self-equipment. Actions by independent groups made up of teachers working in the production of educational materials must also be supported. Actions concerning development and evaluation of educational materials should be the concern of a state department.

To combat the lack of educational materials and more particularly materials for science and technology, the training and motivation of national authors and designers deserve to be supported more fully by the relevant national authorities.

The actions to be carried out must aim at reducing production costs. The choice of technological processes of production will take into account the size of the market and the buying power of the population. The following processes can be used for printed aids: roneo, duplicator, electronic engraver, offset, computer-aided publications. In the area of production of laboratory materials and self-equipment, workshops must have light equipment which will make it possible to carry out work common to carpentry, glass blowing, electricity, small mechanical manufacturing. These workshops will have the duty of producing all elements which are needed to make educational materials. Works concerning assembling of equipments and finishing must be carried out in workshops which are less equipped and which are located near areas of utilization.

The distribution market for educational materials suffers mainly from a lack of information about the possibilities offered for the consumers. The variety of textbooks proposed to pupils' parents poses difficulties when it comes to choice. Firms specialized in disseminating laboratory materials are rare and the equipments delivered are not accompanied by maintenance leaflets. After sales service is more often non-existent. The effort

needed is to organize the supply and dissemination circuit better and to guarantee an after sales service capable of either ensuring maintenance of the appliance or supplying spare parts.

It will also be useful to organise practical courses for science teachers in active life and include technological disciplines in pre-teacher training. This aspect has been in operation in Mali for five years. What remains is to encourage closer collaboration with science teachers in order to produce science materials jointly.

It should become an obligation for each pupil teacher in final year classes to design and manufacture a laboratory material accompanied by instruction leaflets. Teachers should also be trained in maintenance through practical courses.

At the regional level, inter-African cooperation is based on the harmonization of curricula contents particularly in scientific and technological subjects. Despite the diversity of the States some points are common to all, particularly in science and technology. Regional cooperation could be achieved in the following areas:

- exchange of documents;
- organization of meetings.

Within the context of cooperation, facilitate access conditions to operational technical infra-structures of states which are inadequately equipped.

The final long-term objective is to enable the African teacher to have a detailed lesson plan, leaflets, brochures, models, instruments.

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## **APPENDIX I: SOME MATERIALS DEVELOPED IN MALI**

### **1. Printed Aid (Booklets)**

#### ***Documents for Technical and Vocational Education***

- Introductory courses for word-processing;
- Typing presentation;
- Accounting exercise;
- Construction material (3 volumes);
- Topography course (2 volumes);
- Topometry;
- Introduction to the technology of roads and bridges;
- Shorthand course (teacher's manual);
- Shorthand exercises (pupil's manual);
- A resistance of materials course (teacher's manual);
- Teaching of technology in technical and vocational education;
- Hydrology (in Sahelian countries);
- Introduction to basic economy;
- Guide on how to set up a small concern;
- Introduction to life and to business management.

#### ***Software***

General Educational software have been developed by teachers within the framework of their training activities.

#### ***Laboratory Materials***

- Electrolysis tank;
- Appliance for the study of momentum;
- Electric motor;
- Ammeter with mobile frame;
- Differential winch;
- Equal base scales;
- Manometer with U-tube;
- Thermal ammeter;
- Optical bench;
- Bell-type vibrator, melde vibrator;
- Stroboscope;
- Appliance for marionette experiment;
- Panel for the study of forces;

- Manual vacuum pump;
- Potentiometer;
- Study of fall;
- Spring balance;
- Laboratory biogas unit.

### ***Self-Equipment***

Making two drills automatic with pupils' participation:

- Design of lathe accessories;
- Manufacture of various tools;
- Manufacture of cupboards for storing tools;
- Design of a prototype for a manual pump with a piston that can be unwound;
- Design of a tension regulator;
- Wall dustbin;
- Poultry feeding trough.

## **2. General Education Technology, 9th schoolyear**

### ***Production Slip***

#### **LABORATORY BIOGAS UNIT**

The appliance proposed will make it possible to obtain fuel gas (methane) from cowdung or any other animal excrement. This biogas unit can be used by teachers to illustrate their science lessons and domestic science. Carrying out this experiment will enable the following objectives to be reached:

- encourage a spirit of creativity in the child by the utilization of technological solutions according to local realities;
- create within the child a spirit of economy by using waste scrap materials;
- train pupils to use certain techniques in metal work;
- produce gas which burns from biomass;
  - apply theoretic notions by making lessons concrete.

Table 1

Rep	N°	Designation	Material used	Dimensions	Comments
12	1	Tap	-	-	-
11		Waterproofness joint	water	-	-
10	1	Lower gasometer	metal	450 g tin	tin
9	1	Upper gasometer tank	metal	450 g tin	tin
8	1	T square link	-	-	-
7	-	gas	methane	-	-
6	-	flexible pipe	plastic	-	-
5	2	nut	metal	-	bicycle valve nut
4	2	bicycle valve	metal	bicycle	valve removed
3	1	burner	metal	2 kg tin.	-
2	1	fermentator tank	metal	-	tin
1	1	biomass	dung water	-	well mixed

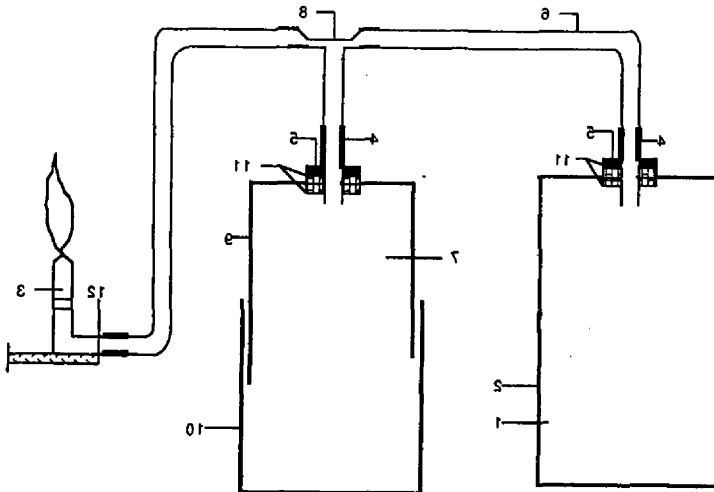
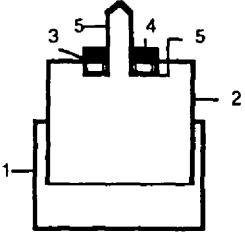

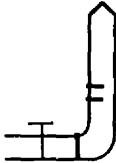
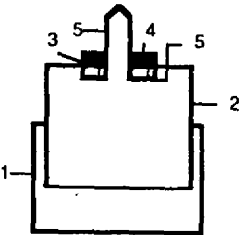



Table 2

PHASES	DIAGRAM	COMMENTS
<p>1. Identification of the different components of the gasometer</p>	 <p>The diagram shows a cross-section of a gasometer. Part 1 is the outer container. Part 2 is the inner tank. Part 3 is a plastic link connecting the inner tank to a valve assembly. Part 4 is a nut used to tighten the valve. Part 5 is the valve itself, which has a threaded top and a bottom flange.</p>	<p>Setting up the valve(5) on the tank (2):</p> <ul style="list-style-type: none"> <li>- put the plastic joint (b) on to the valve (5);</li> <li>- fix the valve to the tank (2)</li> <li>put the plastic link (3) on to the valve;</li> <li>- tighten the valve on to the tank with the nut(4).</li> </ul>
<p>2. Boring of passage hole for the hupper valve of the gasometer</p>	 <p>The diagram shows a rectangular tank with a hole in the top surface, indicated by two short parallel lines.</p>	<p>Bore a hole same size as the other diameter of the threaded part of valve in the upper tank of the gasometer</p>
<p>3. Cutting out and boring the burner</p>	 <p>The diagram shows a burner assembly consisting of a vertical pipe with a small hole near the top and a base with a horizontal inlet pipe.</p>	<p>Cut out a metal pipe of sufficient length. It must be possible to place the metal pipe in the flexible pipe. Bore two small holes in the metal pipe. These holes will ensure that combustion is kept going because of the inflow of oxygen.</p>
<p>4. Identification and assembly of the various components of the fermentator</p>	 <p>The diagram shows a cross-section of a fermentator. Part 1 is the outer container. Part 2 is the inner tank. Part 3 is a plastic joint connecting the inner tank to a valve assembly. Part 4 is a screw used to tighten the valve. Part 5 is the valve itself, which has a threaded top and a bottom flange.</p>	<p>Putting the valve (5) on to the fermentator tank (2):</p> <ul style="list-style-type: none"> <li>- put a plastic joint (6) on to the valve (5),</li> <li>- assemble the valve on to the tank (2),</li> <li>- put a plastic joint (3) on to the valve,</li> <li>- tighten the valve on to the tank with screw (4)</li> </ul>
<p>5. Boring of passage hole for the hupper valve of the fermentator</p>	 <p>The diagram shows a rectangular tank with a hole in the top surface, indicated by two short parallel lines.</p>	<p>Bore a hole same size as the other diameter of the threaded part of valve in the upper tank of the fermentator</p>
<p>6. Assembly the whole unit.</p>	<p>See drawing with nomenclature</p>	<p>Refer to other comments and carefully check waterproofness of the system.</p>

### 3. General Education Technology - 7th Year

#### Preparation Slip (Time: 1 hour)

#### PORTABLE DIGESTOR WITH INTERLOCKING CASKS

##### 1. Objective

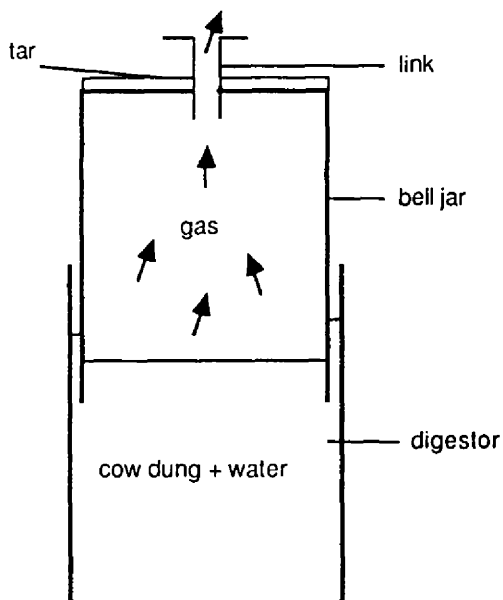
The pupil must be capable of constructing a functional portable rudimentary digester using salvaged (waste) materials.

##### 2. Material

- Tins (tomatoes, milk) of different diameters;
- a plastic link;
- slate or if possible tar;
- salvaged bicycle innertube with a working valve;
- fresh cowdung, water, sand.

##### Methodological Guide

(a) diagram





- The bell must be painted in black, block well with tar mixed with a little sand;
- Take 1 litre of water for 1 kg of fresh cow dung, mix the cow dung well before putting it into the digester;
- Plant the digester in the sun in the schoolyard, keep a check on them for a whole week;
- The bicycle innertubes will be filled with gas for storage as soon as the bell jar starts to lift itself up;
- Burn the gas obtained.

### *Evaluation*

- Check that each pupil (or group of pupils) has made his digester properly and that he is really getting a release of gas;
- Get those who have not been able to get any gas to rebuild their apparatus by correcting the technical errors.

N. B.: In case the appliance does not work, it will be necessary to check the airtightness of the materials and the mixture (quantity of cow dung to mater).

If there's no cow dung, the teacher can use other animal excrement.

## APPENDIX II

### TECHNOLOGICAL TRAINING FOR PUPIL-TEACHERS OF HIGHER TEACHER TRAINING COLLEGES (ENSEC) AND PEDAGOGICAL INSTITUTES FOR GENERAL EDUCATION(IPEG)

#### **Pedagogical Training**

Technology Education covers 8 areas in IPEG<sup>1</sup>: carpentry, sculpture, leathercraft, shoemending, weaving, metal work (sheet metal), electricity, masonry. This education covers five areas in ENSEC<sup>2</sup>.

Training in teacher training colleges do not aim at training professionals but workers capable of mastering simple assembling techniques, understanding educational materials better and capable of explaining how they are operated. The teacher must try to avoid long theoretic explanations not followed by practical demonstration and should chose as often as possible practical work from objects in the pupil's environment or capable of serving as a mainspring for his full development (see indicative lists at the end of each programme). Certain technical objects quoted as examples will be produced by groups of pupils within clubs formed at the level of each college and working outside school hours.

These same objects could be produced by the teacher in the presence of the pupils. These two approaches have the advantage of allowing the pupils to participate or to follow the production of an object which would demand time, material and enough working materials before the production can be completed - conditions difficult to meet at the present time. However, these apparently complicated works are only syntheses of the learning of simple needs taught before hand and mastered by the pupil and teachers. The last year will be

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<sup>1</sup>The Pedagogical Institute for General Education (IPEG): provides training for teachers in the first level (primary school teachers).

<sup>2</sup> Higher Teacher Training College (ENSEC): provides training for second level (middle secondary school teachers).

Primary education in Mali has two levels:

- a first level of six years corresponding to the French primary school system;
- \* a second level of three years corresponding to the middle secondary school in the French system.

- The bell must be painted in black, block well with tar mixed with a little sand;
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reserved for this synthesis work that is, for the development of educational materials and useful objects for the pupil's environment.

Teachers are recommended to set up a mechanisms laboratory from salvaged materials and to proceed to theoretical studies followed by practical demonstrations (dismantling, assembling, measurements). No lesson should be carried out without materials or documents relating to it whenever this is possible.

Avoid going into useless details and present a concise summary containing only the important elements.

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## Chapter Fifteen

# Low-Cost Production of School Science and Technology Materials

*Cheikh THIAM* \*

The topic on which this paper is based is best presented by providing answers to two basic questions:

- Why do we need innovative educational materials?
- What strategies are needed for an inexpensive production of materials adapted to our needs?

There is no claim in this paper to having all the answers to these questions, it is merely a contribution to a debate which should enable us to discuss this problem in more depth.

Many determined educationists in Africa today are concerned about the problem of educational materials just as I have been for some time now. For more than seven years, and since I became head of the maintenance and manufacturing unit of educational materials in the Science and Technology Institute in Senegal, I have been trying to find answers to these questions.

For the past few years, the educational systems in under-developed countries have been undergoing a more or less total reform. The aim of this reform is to adapt education to the realities of the countries, concentrating on course content as well as methods. Educational policies had to be prepared to put emphasis on education for development.

Through a lack of appropriate materials, teaching has been limited to lectures supported occasionally, by illustrations on the chalkboard, to the detriment of active teaching which is the sole guarantee for training a person. It is also the only effective way of offering learners the possibility of integrating knowledge by

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\* Teacher of Technological Education, National Maintenance Office, Science and Technology Institute of Senegal.

themselves and for their own benefit. Therefore, one must be taught to learn and all forms of learning call for pedagogical aids, whether printed or not.

Consequently, the production of educational materials appears to be the answer to a methodological goal. Indeed, without materials, it is impossible to train pupils to observe and to experiment, activities without which teaching remains dogmatic and cannot in any way lead to a true awakening of pupils.

The trainer who has become an organizer can only come in to formulate conclusions from results and to facilitate the structuring of knowledge by helping to establish relationship between different concepts and to develop comparisons and syntheses.

This type of teaching has often been handicapped by lack of materials. It was once thought that the materials to be used should be produced in specialized companies established in developed countries. Suddenly, it was realized that imported school equipment cost more and that they were becoming less and less adapted to our curricula and teaching methods. If we add the enormous problems caused by difficult economic situations, we can understand why our education budgets can provide the necessary educational materials only with great difficulty.

Faced with this situation, educational authorities and experts have supported research efforts towards developing and producing teaching aids, particularly equipment made from local and reprocessed products. This is why local or even regional production of educational materials achieves a second objective, economic this time, in so far as it will enable countries with limited means to produce locally most of the materials necessary for adequate teaching from available materials in that country.

### **What Strategies for Inexpensive Production?**

As already stated, the unfortunate coincidence is that financial difficulties are being increasingly felt at the moment, when the tendency for experimental education has considerably multiplied. What can be done? We can sink into despair. We can also wait and see: every crisis comes to an end. Or, indeed, we can, following the adage "turn a set back into victory", turn our difficulties to good account by thinking up original solutions - inexpensive and educationally valuable. We must understand

that such situations are really possible and that they exist.

## **Design**

There is no general design technique for educational materials. The value of resources depends on the skill with which one gets the best of them. Each chosen solution must be intended for specific ends: helping to solve a problem; rendering the exposition of a principle more meaningful; encouraging the curiosity of learners, etc. Trainers must show imagination. They only need to look around them to discover that they have plenty of resources which they can make full use of at their disposal.

For example, for teaching science in our countries, we still find on order lists to foreign companies titles such as rocks, ruminant skeletons, etc. It is with great regret that I ask myself how many skeletons of cows, horses, donkeys, sheeps, etc., abound in the countryside and even in the most modern capitals of Sahel countries during the hard years of drought which killed nearly all our herds.

A wood or a forest near a school will enable pupils to observe seasonal changes amongst animals and plants, and to study their way of life, to discover how animal life and plant life depend on each other, how physical environment affects living things, etc.

During my modest experience, a colleague told me about a problem which was no less important. How can one convince pupils that the blue blood represented in the classical schema of the circulatory system is not really blue blood, but blood laden with carbon dioxide and impurities? If only I had, he said, a device which shows bright red blood laden with oxygen and energy and dark red blood laden with carbon dioxide and impurities!

You can see that this is the key to his problem. Indeed, inspired by his idea and the classical schema of the circulatory system, I was able to find that coloured water circulating in perfusion tubes would solve the problem. The pumping problem was solved by two pear-shaped rubber devices or two pipettes containing liquids of different colour.

In certain subjects in general education, the trainer will use questionnaires to collect information on the environment. Sometimes, he can simulate situations in the classroom to draw conclusions by analogy.



In the following example, the home economics and social studies teacher wanted to point out certain fundamental concepts in demographic evolution and utilization of resources. I suggested that he compared his class to a country with limited resources. And together we came up with the following method:

1. The teacher makes an inventory of materials in the class (country): chairs, books, drawing materials, scientific apparatus, etc. assuming that a pupil leaves the class for good and that a new one is allocated to the class (one coming in - one leaving) that could represent *the balance between birth and mortality rates*.
2. If the class accepts a new pupil without one leaving, the teacher adds another table with all the articles which the pupil needs, so that the whole class becomes *aware of the quantity of materials he uses during a given period*.
3. If stocks of a particular material run out, benches, books, exercise books will have to be shared, which indicates a *drop in standard of living*.
4. Borrow from a class which has surplus means *cooperation, commerce, etc.*
5. Try to get materials from another class without permission, or persuade a child from another class to give his book in exchange for a repayment sum in case of low: *economic or political aggression*.
6. Let us assume that the teacher's attention constitutes the main service given. If he gives five minutes attention per pupil per day, what will be the effect of the arrival of new pupils on the amount of time available for collective teaching? If the time allocated to this teaching is fixed in a particular way, what will happen to that which must be devoted individually to each pupil?

*Increase in population forces one to take decisions concerning the relative value of different services.*

We can thus see that it is difficult to prescribe a design

technique for teaching tools. However, we must place more importance on the influence of initiative of teachers who will become increasingly confronted with difficult pedagogical problems whose solution can be found with just a simple effort of imagination. That is, in their intrinsic capability of thinking over their action, of discovering and having recourse to different possibilities in the environment. We are forced to recognize that this relatively simple objective will not be achieved without a minimum of initiative and a love for the profession.

Is there any teacher who has not said, at least once, during his career in the classroom and seeing that the message is not getting through: *If only I had such a device.*

He must not stop there, he does not have the right to. The idea which he has put forward provoked by need can give rise to a teaching support, of course original, which can render precious service to all teachers. You will agree with me here that experience plays the most important role in this area. If he has thought of an object to be produced or a scene to be staged or even a situation to be simulated he must note down his idea clearly for it is only in that moment that his idea is clear to him. Afterwards, he will determine the different parts, he will outline the definition of the roles of each element without forgetting the objectives to be achieved. Experiences of other colleagues can only enrich his ideas.

## **Creation**

From its design to its creation, the educational material presents a particular complexity however simple it may seem at first. If one does not want to create for the sake of creating, the teacher must be present from start to finish of the process. Nobody can, and in fact nobody should, do it in his place.

In the case where creating the device does not need the transformation of material, the utilization of machines or tools, the problems will be fewer. The teacher will present it in the form of activity cards with all the necessary details. All that remains to be done is to test it, analyse the results and improve the document if need be, etc.

On the other hand, if it is a mechanism or an object to be created, certain techniques must be mastered. It is true that in school as well as at home, it is advisable to be clever and to be good with one's hands. And, of course, basic knowledge is

necessary.

In countries which have more experience in this area, there are two different possibilities: either the process of creation and popularization is centralized in a national institution or it is decentralized at schools, inspections, teacher training college levels, or even at each administrative division level of the country.

In a country like Senegal, there could be production workshops equipped with machines and appliances to work with materials which can be found locally. The personnel is made up of workers and a few experienced teachers who work there part-time or full-time. It is hoped that in combining the sometimes well-hidden wealth of imagination of some teachers with the resources of this institution, new solutions can be found.

Through well-prepared questionnaires or any other means, the centre collects ideas from man in this field. But, I must make it clear that it is essential, right from the start, to study motivation criteria in order to obtain massive and effective participation by colleagues, their job being an unrewarding one, more effort is always demanded of them.

If a prototype is chosen, a study will be carried out, preferably with its designer, by educational specialists and the head of the centre; the latter when made familiar with the objectives desired, will decide if creation is possible. In that case, he will study the plans and suggest local or reprocessed materials and simple technological solutions. He will calculate the cost price and will ensure that the prototype is manufactured. The technical commission of teachers and consultants at the centre will judge the educational qualities of the prototype without forgetting to consider the objectives given by the one who thought up the idea, and all that he can suggest as possible educational utilizations. It is only after their adoption that mass production can be started. The head of the centre will have the final cost assessed and will place an order for raw materials. It will be necessary to produce a pedagogical guide on how to use this new material. In the case of mass production of objects of mechanisms, technical schools must be consulted. These works should, in agreement with workshop teachers, be integrated during the course of practical lessons. This collaboration presents several advantages:

- cost price: 40% of that on the market;
- through the centre, technical schools would thus have at their disposal materials which they could not have acquired easily;
- producing useful components will serve as motivations for pupils.

Another aspect of the problem is the distribution of materials produced. If the centre is autonomous, schools will come to buy there at suitable prices. On the other hand, the centre can be asked to manage the country's financing in matters concerning teaching equipment. In that case, supplies will be free.

The second procedure is the centralization of the system. Activities will be undertaken in schools, training schools, departmental or regional inspectorates. Implantation of a production unit is necessary. As well as a small kit of machine tools, the unit will have reprography materials at its disposal. It will welcome all teachers who come to suggest their ideas, to participate in analysing and as far as possible in producing and testing of materials.

The first phase, which is the most essential, consists of making teachers understand the importance of their action. Consultation and organization units, arranged by subject, are greatly recommended. Pupil teachers should not be idle, many ideas can come from them.

For this policy to succeed, education authorities should, through national or regional training courses, present more advanced experiments and introduce trainers to the production of some types of simple materials made from local or reprocessed products. They must make sure that this message is passed on to all teachers in service for a more widespread popularization. Armed with these examples and encouraged by authorities, teachers will undoubtedly contribute to the development of education in their country.

We must point out here the importance of introducing the use of manual tools and activities relating to producing simple educational materials in training programmes for trainers.

When results start to appear and prototypes are perfected, those in charge will decide when to group all prototypes together with a view to their dissemination. This dissemination will give all the technical information and necessary details to enable each teacher or group of teachers from the same school to produce its

own device, by means of a liaison bulletin, for example.

Those in charge will ensure that the products to be used are available. For the collection of waste materials, participation by pupils produce good results.

Before concluding, I would like to talk about another necessary measure which is not less important: maintenance of equipment. Indeed, I am now convinced that it is useless to acquire educational equipment without taking necessary steps to ensure its good maintenance. These problems will only be put off with more serious implications later.

Most of our countries depend on foreign production of our educational materials. And, faced with the growing cost of these equipments, maintenance is an urgent necessity. The investment costs of all equipment necessary for a school for general education or that for technical education, will be sufficient for setting up a moderate production factory or a centre for maintenance.

Although investment amortizations in these areas are added to the cost price of the finished product or of services rendered, the people in charge cannot limit their attention to the production and sales. They must attach particular importance to the maintenance of their production potential.

The school on the other hand, cannot present its results in turn over which would justify its expenses. It is therefore surprising to note that schools make no effort to undertake maintenance and that they let their patrimony deteriorate often irreversibly. I cannot go into details about maintenance problems. But I wish to point out that in 1986, I produced for UNESCO/BREDA a technological maintenance guide for technical schools. The methods proposed can, to a certain extent, be adapted for all educational institutions.

Experience has shown that a high percentage of breakdowns is due to wrong handling of appliances. Breakdowns were more frequent when I had new colleagues. I came to realize that it was necessary for them to get to know the appliances available in the block. I therefore decided to develop user manuals for these appliances; these manuals must clearly present different parts of the appliance, its principle of operation, utilization precautions, elementary functions of maintenance (changing fuses, lamps, etc.) and especially some pedagogical advice on how it works. In short, one must go further than the manufacturer. To do this, pedagogical consultants must be

involved in the work.

The advantage of the latter is that they could advise young teachers on the rational use of the appliances.

Results were felt immediately - the rate of this type of breakdown dropped considerably.

To conclude, I hope that everyone is fully aware of the necessity of maintenance. Many factors affecting educational materials availability in schools in Africa depend on it.

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## Chapter Sixteen

### **Possibilities of Low-Cost and Teacher-Made Educational Materials: Some Illustrative Examples**

*Obert P. NDAWI\**

The possibilities in the areas of low-cost and teacher-made materials for teaching are limitless. One thinks of counters, wall charts, simple pieces of apparatus, cultural artifacts, models simplified from sophisticated apparatus, presented biological specimens and the like.

This chapter will present the Zimbabwean experience in the provision of simple low-cost scientific apparatus for pupils in remote, rural secondary schools. There will then be examples of additional models that I have made and successfully used in my own teaching.

#### **ZIM-SCI: A Response to an Educational Material Crisis**

At independence in Zimbabwe (1980), only 12% of the pupils who completed primary education were able to squeeze into secondary school. The Ministry of Education had to tackle the problem of providing secondary education for all, the products of the then expanded primary school intake. People anxiously waited to see how science could be taught to so many pupils in such remote schools with no qualified teachers, no electricity, no laboratories, no tap water, no gas - hardly anything except pupils.

The answer was to come in the ingeneous but simple Zimbabwe Secondary School Science Project (ZIM-SCI).

The ZIM-SCI KIT consists basically of the following simple

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items:

- a small cardboard box with basically 14 items of apparatus for each pair of pupils;
- a metal cabinet with a selected range of items and chemicals for the teacher;
- a series of cheap booklets - pupils' study guides;
- a series of cheap booklets - teachers' guides.

Although the items of apparatus were ready made, they are very low-cost, and indeed "teacher-makeable".

The pedagogical possibilities of the kit are in fact limitless. They can, for example, be used for:

- measuring volumes, observing liquids, reactions;
- filtration, evaporation, boiling;
- experiments with senses of smell, temperature, sound, taste;
- burning;
- pressure;
- viewing slides, etc.

In addition, pupil's study guides could easily be produced by teachers, and so can teachers guides, using the kit as a basis.

### **Teacher-Made Material to Illustrate Concepts in Electricity**

Many concepts taught in *electricity* are difficult for learners to comprehend. This is largely because of their abstract nature. For example, the learner cannot *see* potential difference in a battery, current in wire, or resistance in a wire.

The model created can help to visually demonstrate these concepts. It can be mounted on a hard board, and was first used by the author in 1979 (See page 211).

### **Teaching Aspects**

- a) Coloured water running through the tube and coming out at the jet can illustrate the concept of current flowing through the circuit.



- b) Raising and lowering the jet will alter the difference in potential between the jet and the water in the reservoir with a consequent effect on the rate of flow of the water current from the jet.
- c) Planning accessories A1 and A2 at the jet without changing "pel" will show how high and low resistance wires, can alter the rate of flow of current. Thin wire will be seen to have higher "resistance".
- d) Fitting A3 will show the liquid branching and recombining like current in a parallel circuit.
- e) Running water from the jet across the vanes of the wheel will turn the wheel showing how current can be made to do mechanical work.
- f) Proper electrical circuits on circuit boards can then be used together with the model to show the actual electrical concepts being illustrated visually on the model.
- g) The accessories can be fitted on the model together to illustrate the concepts simultaneously.

### **Potentials of Cultural Artifacts**

Some of our traditional cultural instruments offer a world of potential for dealing with scientific concepts without the use of sophisticated commercial apparatus which may be available or, if available, too expensive to procure. Being more familiar, the learner is likely to understand better using them.

The catapult, for example, is a simple traditional lethal weapon which can be used to illustrate concepts of potential energy, Hooke's Law, kinetic energy, work, gravity ( $g$ ) and even equations of dynamics without the use of sophisticated dynamics equipment.

By stretching the catapult to various required lengths and releasing it vertically upwards, timing the time of flight, the height to which the stone goes can be calculated. From this and the mass of the stone, its (i) velocity of projection, (ii) initial KE, (iii) acceleration due to gravity, (iv) initial P.E., (v) work done in stretching the catapult can be calculated. From these, the

dynamics equations:  $V = U^2 + 2ax$ ;  $x = ut + \frac{1}{2}at^2$  and  $V^2 = u^2 + 2ax$  can all be considered. Furthermore, by firing the stone at various angles of projection, the effect of angle of projection on the range of a projectile and its maximum height can be actively discussed.

In the example of the stone, poised at an acute angle to the ground supported by a system of sticks and a string with (a) the mouse attempting to eat the bait triggers, the system and the slab falls on to it; (b) a very thin stick, experiencing a tiny force ultimately supports the large weight of the slab. Thus, concepts of forces, their points of application, their magnitudes and their moments can be lively illustrated to high school Physics students, as in the following examples:

1. The forces  $W, F_1, F_2, F_3, F_4, F_5$  can be identified;
2. The points of application of these forces can be noted and hence their moments about the pivot calculated;
3. By measurement and calculation, the diminishing magnitude of the forces from  $W$  through  $F_1, F_2, F_3, F_4$  to  $F_5$  may be established;
4. The moments of the balancing forces can be compared using the principle of moments;
5. Methods of reducing excessive tension at weak points can be discussed e. g. moving the position of the appropriate pivot.

### ***Possibilities and Prospects***

Classroom use and development of the materials used for illustration in this chapter tend to face the following problems.

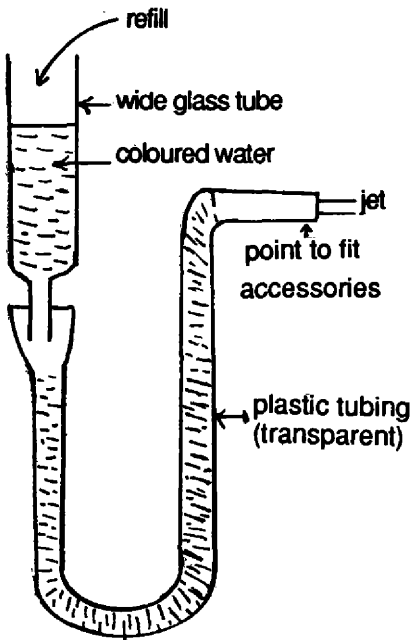
- *Teacher Initiative*: Many teachers lack initiative and courage to venture into the unknown. This is because of sheer complacency or lack of sophistication due to limited education.
- *Examinations*: Much teaching is geared to public examinations and the teacher feels it may be irrelevant to teach using unorthodox apparatus. They lose sight of the need to try all means of putting the concept clear.
- *Ready Acceptability*: Teachers generally resist new ideas and feel more confident to teach the way they were taught.

It would therefore be necessary in Africa to establish:

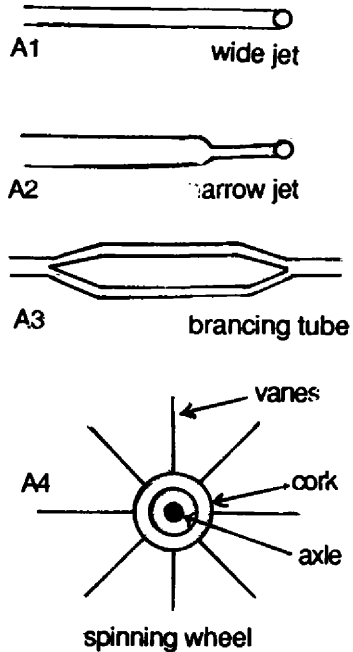
- an information bank on these possibilities;
- a structures which could help disseminate information;
- staff exchange programmes that could facilitate exchange of ideas.

**A visual model to illustrate concepts in electricity**

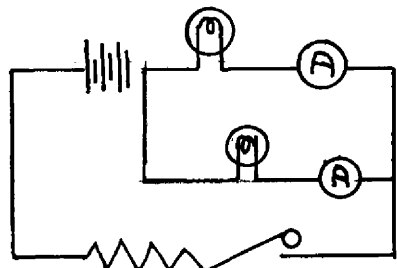
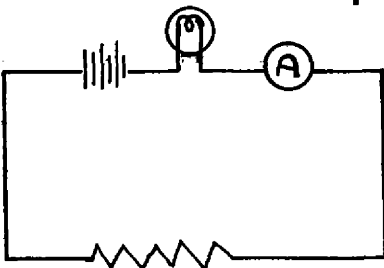
**Model**



**Accessories**



**Proper electrical circuits**



Parallel circuit for branching current

## APPENDIX

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## **Summary of Workshop Proceedings, Recommendations and Suggestions**

The workshop/seminar from which the papers in this volume were obtained was organized by the NEIDA Coordinating Unit in October, 1988 within the framework of the preparatory phase of the UNDP/UNESCO Project entitled "Regional Technical Cooperation in Education for the Development of Human Resources in Africa" (RAF/87/169)<sup>1</sup>. The third component of this project to which the workshop was directed is concerned with Production and Dissemination of Educational Materials. The component has as its general objective the strengthening of the capacity of national services to develop, produce and ensure the appropriate use and adequate maintenance of educational materials in-school and out-of-school at low-cost and adapted to the needs of the countries, particularly through the development of local production, regional or sub-regional joint production and the control of the standards of important equipment. The component deals with various aspects of the education system, including general education, distance education, literacy and adult education, productive work and science education and technical and vocational education.

In a bid to produce a state-of-the-art document on educational materials development, production and dissemination in the Africa Region, the seminar/workshop brought together specialists in this area and working in Africa to present papers on the activities undertaken in their respective countries. The papers presented, as reproduced in this volume, were on current shortages/inappropriateness, development, production and dissemination of educational materials. Some of the papers also suggested mechanisms to reinforce regional cooperation.

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<sup>1</sup>With additional funds from the E.I.F. (Educational Infrastructures and Facilities) Unit of BREDA.

## **Workshop Proceedings**

The workshop began with opening remarks by the Deputy Permanent Representative of UNDP in Dakar followed by a brief welcome address by the Director of BREDA.

The business session of the workshop/seminar started with an orientation paper, reproduced here as the introductory chapter, to set the pace of activities for the workshop/seminar. Representatives of 12 countries (Côte d'Ivoire, Ethiopia, Kenya, Lesotho, Mali, Mauritius, Mozambique, Nigeria, Senegal, Sierra Leone, Togo and Zambia) presented papers on the situation in their respective countries or on specific problem areas in which they were working. In all, the papers presented and discussed the following sub-themes:

- government-agency initiatives;
- private sector initiative;
- local community and individual teacher initiatives; improvisation of educational materials;
- a special focus on science, technology and vocational materials.

These themes with slight changes thus formed the structure of this volume of readings.

The presentation of papers was followed by sub-committee work in three groups discussing the matters arising under the following headings:

- i. mobilizing teacher/private sector/NGOs/the entire populace;
- ii. catering for sensitive areas (e. g. materials for laboratory work, use of physical space, materials for technical/vocational education, laboratory/workshop furniture);
- iii. inter-African cooperation.

Reports from the groups were presented and discussed in a plenary at which recommendations and suggestions made for future action were approved.

## **Suggestions and Recommendations**

*Recognizing* the dearth of educational materials in African countries and the desperate efforts by governments and

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institutions to obtain relevant and appropriate materials in adequate quantity;

*Noting* the initiatives to develop and produce educational materials in both government and non-governmental sectors;

*Aware* that the issue of distribution of educational materials is a generally problematic one and that these are factors militating against effective utilisation of new materials, like sporadic changes in the school curriculum and negative attitudes towards these materials;

*Appreciating* the fact that in a few cases in African countries, collaboration had existed between government and the private sector in the process of educational materials development and production;

*Cognisant* of the many similarities between African countries such as economic, the colonial history and its present day effects on development efforts, weather, culture, official languages and socio-political background and that there are several existing inter-African organizations and agencies, and

***This Seminar Recommends:***

1. That African governments be interested in the activities of all non-governmental organizations in the area of development, production and distribution of educational materials and coordinate the activities of organisations that are committed to the development and production of educational materials in case where no such central coordination exists to prevent duplication of efforts.
2. That in countries where private initiative is high leading to an "over-production" of school textbooks for the primary and even secondary level, government should take measures to pool the resources of NGO's, thereby reducing current problems of duplication and lack of coordination, and subsidize their efforts.

3. That governments should encourage teachers to produce educational materials and provide adequate incentives in cases where such materials are judged useful. Government should identify talented teachers at all stages of their profession and even at the retirement stage, and co-opt such teachers into writing teams. Training programmes in developing writing skills can be organised. When such writing workshops are organized, it is suggested that publishers be invited to share their experiences, as evidence suggests that certain problems of production can be identified early and avoided if publishers made some input at the writing stage.
4. That governments organize pre- and in-service training for teachers in the maintenance and use of equipment. Organising in-service training for teachers, and even teacher trainers and material designers in the mastery of graphic techniques and the use of equipment as well as simple maintenance work is essential to the problem of development and production of educational materials in Africa. Suppliers of equipment should give information on the installation, functioning and maintenance of equipment. Steps to follow in installation and storage conditions should be clearly indicated in the manuals that are sent with science and technology equipment.
5. That, in view of persistent complaints about the non-availability of books, particularly in rural areas, coupled with ineffective distribution mechanisms, governments should mobilise not only regional education personnel, but more generally district administrators to ensure the safe and rapid delivery of books to schools. To this end, governments should encourage the formation of subject teacher associations and strengthen existing ones. Through these associations, teachers can be mobilized to deliberate on methods of books preservation, to review educational materials and make recommendations to governments. Teachers initiatives can be mobilized through teachers' journals.
6. That governments can relate to the private sector by mobilizing their support and cooperation in the control of



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the price books. Governments should encourage the formation of publishers' associations which can, among others things, identify training needs and mount programmes geared towards improving the general standard of publishing. Such an association will be beneficial for the pooling and sharing of resources.

7. That mobilisation of the local community can take the form of active contribution towards the provision of infrastructural facilities such as chairs, desks and school buildings. Schools in need of additional instructional space such as a school farm, garden or playground can make use of existing structures in the community. In cases where local cooperation exists, governments should give due recognition to communities who offer their services to schools.
8. That fact-finding tours to discover what is going on at the grassroots levels in other countries should be organized to provide a strong basis for reviewing national efforts by proven specialists in specific fields. In this way, creative individuals working on their own in these countries would be identified and used.
9. That national government should organize internal cooperation among specialists and institutions in the area of educational materials by defining, laying down and operating consistent policies. This is because it is often observed that many agencies could be doing the same thing in the same country without any cooperation or coordination.
10. That an inventory of institutions whose areas of activities are relevant to the problem of educational materials development, production and distribution be taken. This inventory should take into account the facilities and programmes they offer as well as their needs. Such a document will help in working out the modalities for cooperation for the benefit of various countries.
11. The setting up of the necessary machinery for monolingual and multilingual cooperation for the

development, production and distribution of educational material. To this end, NEIDA can offer positive recommendations to various African governments.

12. That the spirit of nationalism in some African countries preventing the free movement of educational materials should be overcome by arousing awareness among non-participating countries in inter-African cooperation. This could be done through information on activities of the cooperating group sent to such countries. Involvement of non-cooperating Member States at this level can begin with cooperation between private sectors in these countries, after which the government of the non-participating country can be invited to participate at the regional or inter-African level. Cooperation between private sectors in different countries is likely to produce results at the national level.
13. That standardization of orthographies of languages that cut across national barriers should be done on regional basis rather than individual countries having different ways of writing the same language.
14. That every effort should be made to uphold instances of inter-African cooperation in the area of development and production of relevant and appropriate educational materials. Governments, in turn, must ensure that due recognition and support is given to these efforts. To this end, special studies of the underlying reasons for the failures of previous sub-regional cooperations in the African continent (e. g. the Mano River Book Development Project, the Regional Textbook Centre and the Botswana Union) in the field of educational materials production must be undertaken.
15. That Africans themselves should learn to believe in and accept what they produce whether it be books, laboratory equipment or educational institutions. In this way, they will be able to overcome the feeling of inferiority resulting from the colonial experience.
16. That countries or parts of countries within certain geographical divisions (e. g. Sahel of Nigeria, Burkina, Mali,

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etc.) where the climate and people's life style have a lot in common, can have common educational materials produced and where the need arises minor modifications made to these.

17. That inter-African cooperation for educational materials production be made through existing African organizations and agencies where problems are posed between countries by differences in culture. Existing structures which are capable of providing the required framework for cooperation should be identified and exploited.
18. That present attempts on production of educational materials for the blind (i. e. braille texts in English and local languages) be extended to include all forms of physical handicaps. Development of sign language for the deaf and dumb in English and local African languages must be undertaken in various countries.
19. That since enrolment at higher and tertiary levels of education in most African countries are low, resources and facilities for developing and producing educational materials should be centralized to obtain economies of scale. The need to share resources and facilities is particularly appropriate at this level as manpower produced at this level tends to operate beyond national borders.
20. That decisions on changes in educational materials used by public (Government-supported) institutions must be taken in consultation with the appropriate authorities that will be affected. In this way, ample time is provided for preparation of alternative measures to be taken. Where possible, efforts must be made to encourage variety in the materials used by educational institutions through private initiatives. In this way, the provisions by institutions will be enriched.